

**HOW SUBTLE CHANGES IN THE FOOD
ENVIRONMENT CAN HELP CONSUMERS MAKE
HEALTHIER FOOD CHOICES.**

ELKE HUYGHE

2016

SUPERVISORS:

PROMOTOR: PROF. DR. MAGGIE GEUENS

CO-PROMOTOR: PROF. DR. IRIS VERMEIR

Dissertation submitted to the Faculty of Economics and Business Administration, Ghent University,
in fulfillment of the requirements for the degree of Doctor in Applied Economic Sciences

DOCTORAL JURY

Prof. dr. Caroline Braet

(Universiteit Gent)

Prof. dr. Maggie Geuens

(Universiteit Gent & Vlerick Leuven Gent Management School)

Prof. dr. Kelly Geyskens

(Universiteit Maastricht)

Prof. dr. Mario Pandelaere

(Virginia Polytechnic Institute and State University & Universiteit Gent)

Dr. Simon Quaschnig

(Universiteit Gent)

Prof. dr. Patrick Van Kenhove

(Universiteit Gent)

Prof. dr. Iris Vermeir

(Universiteit Gent)

ACKNOWLEDGEMENTS

Het is zover! Het moment waar ik zo naar heb uitgekeken is eindelijk aangebroken. Ik herinner me nog goed hoe mijn avontuur op de vakgroep begon. Op 15 september 2011 mocht ik starten als doctoraatstudente op de vakgroep Marketing bij Prof. Dr. Maggie Geuens en Prof. Dr. Iris Vermeir. Op mijn eerste werkdag begon het gesprek ongeveer als volgt: “Welkom op de vakgroep en vanaf nu mag je ons gewoon Maggie en Iris noemen hé 😊.” Op mijn tweede werkdag was mijn eerste e-mail in mijn inbox de volgende: “Is de eerste werkdag meegevallen?” Wel, ook al was ik de eerste weken wat onwennig en wist ik niet altijd zo goed wat me te wachten stond, het was me wel heel duidelijk dat ik meteen twee hele lieve promotoren had. Maggie en Iris, ik wil jullie ongelooflijk hard bedanken voor de kans die jullie me geboden hebben om te doctoreren, voor jullie waardevolle ideeën, inzichten en feedback, en voor jullie enthousiasme tijdens dit ganse doctoatsproces. Dankzij jullie expertise heb ik dit doctoraat tot een goed einde kunnen brengen. Van het opzetten van het eerste experiment tot het schrijven van dit doctoraat, jullie hebben me ongelooflijk veel geleerd over academisch onderzoek. Maggie, ik bewonder jou enorm, zowel als professor maar zeker ook als persoon! Je hebt een enorme drive in je, hoe jij al je doctoraatstudenten begeleidt met al hun verschillende projecten is ongezien. Bovendien ben je een heel empathische persoon en heb je een heel persoonlijke manier van begeleiding die ik erg kan waarderen! Iris, jij straalt veel rust en positivisme uit en weet vlotjes een academische carrière te combineren met vier kinderen. Het is duidelijk, Maggie en Iris, jullie zijn twee hele sterke vrouwen, bedankt voor alles!

Ook de juryleden wil ik zeer graag bedanken. Prof. Dr. Caroline Braet, Prof. Dr. Kelly Geyskens, Prof. Dr. Mario Pandelaere en Dr. Simon Quaschnig, bedankt voor jullie constructieve feedback en waardevolle inzichten en suggesties. Deze zijn het doctoraat zeker ten goede gekomen. Mario, bedankt ook voor het organiseren van seminars, de retaites,...en bedankt voor je steeds waardevolle feedback op zo’n momenten. Simon, je hebt mij zovéél vragen gestuurd, maar ik kan dit bijzonder appreciëren. Bedankt om het doctoraat op zo’n grondige wijze te lezen en zoveel nuttige suggesties te geven. Maar daarnaast ook bedankt om me steeds op de hoogte te houden van de nieuwste eetadresjes en leuke plaatsen in Gent.

Graag wil ik ook onze vakgroepvoorzitter Prof. Dr. Patrick Van Kenhove bedanken. Patrick, bedankt om mij zo’n welkom gevoel te geven. Bij jou kan iedereen terecht en dat merk je ook aan de goeie sfeer op de vakgroep. Bedankt ook om ons steeds zo expliciet en

hartelijk te bedanken, bijvoorbeeld bij kleine dingen zoals het houden van examentoezicht of het verbeteren van de examens,... Het zijn dergelijke waarderingen die er mede voor zorgen dat de sfeer optimaal is op de vakgroep.

Ja de vakgroep Marketing, daar valt van alles mee te beleven. Plezante lunchpauzes, feestjes, kayaken, met de vespa rijden, zoektochten, terrasjes doen, onvergetelijke conferenties,... Ik wil dan ook graag mijn huidige en ex-collega's bedanken voor al de fantastische herinneringen. Dank je wel Andrey, Annelies, Begüm, Bill, Bram, Caroline, Christophe Le., Dauwe, Dieter, Dirk, Dries, Elke C., Gyanendra, Ignazio, Iris R., Jolien, Katrien C., Katrien M., Laurence, Matthias B., Mathias S., Matthias D., Matthijs, Michel, Michiel, Nathalie, Nils, Philippe, Stefanie, Tess, Tijn, Wai Kid en Willem.

Daarnaast wil ook heel graag Karin bedanken. Jij bent echt een manusje van alles! Hoe jij altijd klaarstaat voor iedereen op de vakgroep is ongelofelijk. Een grote dankjewel dan ook voor al je hulp en dit steeds met de glimlach. Goedele, dank je wel voor alle tips en tricks in deze eindfase van het doctoraat! Jeroen, jij bent een eersteklas grappenmaker, bedankt dan ook dat je onze bureau quasi elke dag voorzag van een aantal mopjes tussendoor en ons na al die afwijzingen nog steeds zo enthousiast meevroeg naar den Berg. Steven, ik vond het heel plezant toen jij onze vakgroep kwam vergezellen. Je bent een enorm hulpvaardige persoon en ziet steeds het positieve in iemand. Nanouk, ik kan je enthousiasme enorm waarderen. Je draagt het hart op de tong, je weet goed wat je wilt en hebt altijd wel zin in een feestje. Ik kon dan ook steeds terecht bij jou voor allerlei flauwekul maar evenzeer voor serieuze gesprekken, dankjewel daarvoor. Julie, wij hebben dikwijls samengewerkt en het viel me daarbij steeds op hoe gedetailleerd jij zaken uitzoekt en vooral ook hoe geduldig jij daarbij bent, daar kan ik nog veel van leren. Daarnaast denk ik nog vaak terug aan onze fantastische Canada-Amerika trip en aan onze avonturen daar. Jaja, twee vrouwen die er toch in geslaagd zijn om zonder paspoort de Amerikaanse grens over te steken. Ik zie ons daar nog zitten bij de grenscontrole bij die gewapende politiemannen en maar uitleggen dat we ons paspoort in het hotel in Canada hadden laten liggen omdat we schrik hadden om het kwijt te geraken. Door samen zo rustig te blijven zijn we er toch in geslaagd om 24u het land in te mogen zonder paspoort en daar een fantastische hockey avond te beleven. En bij elke regenboog die ik zie, moet ik wel 's aan je denken ☺. Tina, met jou had ik meteen een 'klik'. Ik herinner me nog goed onze eerste gesprekken, ze gingen steevast over Dexter, een serie die we toen op de voet volgden. Niet veel later begonnen we met Kung Fu, een sport waar we ons serieus moesten houden en daar dikwijls heel veel moeite mee hadden. Ook al zijn je dagelijkse bureaustops vergaan, elke keer we elkaar terugzien is het terug leute tot en met en ik ben er van overtuigd dat dit

zeker zo blijft in de toekomst! Gudrun, mijn metekindje, jij bent een echte deugniet. Jij zit boordevol energie, en of we nu gaan zwemmen, in bubbelbaden zitten met veel te veel schuim, gaan cruisen in Amerika,...we hebben steeds veel plezier samen ☺, bedankt voor al die afleiding! Anneleen, jou wil ik heel graag bedanken. Het is ongelooflijk hoe competent, creatief en gedreven je bent. Ik vind het echt chapeau hoe jij zo'n bergen werk verzet en meteen de structuur van een paper voor ogen ziet ("Tsjak, tsjak, tsjak"!)). Ik vond het steeds heel plezierig om met jou samen te werken en kan jouw manier van aanpak enorm appreciëren. Daarnaast wil ik je zeker bedanken omdat ik bij jou eigenlijk echt met van alles terecht kon, niet enkel met academische vragen maar gewoon ook onze vele, dagelijkse, gezellige babbels tussendoor ☺!

Verder wil ik ook graag alle bureaugenootjes bedanken. Tine, Maria en Natalia, bedankt voor de gezellige tijd. Christophe, jouw photoshopskills en vooral hoe jij en Hendrik de meest fantastische foto's van elkaar wisten te maken, zeker die op het strand en die van het ros beiaard zal ik niet snel vergeten. Ook je enthousiasme op Bailando (Paradisio) totdat je promotor binnenkwam, was onvergetelijk. 'Doktor' Hendrik, jou wil ik toch ook heel graag bedanken. Dikke merci dat ik steeds bij jou terecht kon voor statistische of allerlei kleine vragen. Maar bovenal kon ik de grapjas in jou ongelooflijk appreciëren, ook al waren mijn PC en GSM bij jou nooit veilig. Ik koester dan ook de mooie herinneringen en in het bijzonder deze waarbij je de slappe lach kreeg of door het raam moest wegvluchten van enkele studenten.

Mijn huidige bureaugenootjes, enorm veel succes met het verdedigen van dat doctoraat. Ik ben er van overtuigd dat jullie dit supergoed gaan doen! Enorm bedankt ook voor de dagelijkse dosissen plezier! Dienneke, dankzij jou ben ik op de hoogte van welke avonturen een hamster dagelijks kan beleven alsook wanneer Wetteren zijn glorie dagen beleeft, oftewel, de Wetterse kermis. Liesbet, jij houdt me op de hoogte van de fashiontrends, doet me lachen met kattenfilmpjes en dankzij jouw recepten eet ik 's wat gevarieerder! Onze leuke tijd in Amerika zal me altijd bijblijven. Charlotte, zot geval. Je bent ongelooflijk creatief en zit boordevol goeie ideeën. Ik zal dan ook niet snel al jouw initiatieven vergeten, zoals bijvoorbeeld den Trival Time. Merci ook dat je steeds kan lachen met de pranks en dat ik je zoveel zaken kon wijsmaken, je hebt me echt heel veel doen lachen ☺. En zoals je weet uit onderzoek, lachende collega's zijn productiever ;). Saar, als ik jou zei "Rol je eens naar hier?", dan wist je meteen wat ik bedoelde. Negen kansen op tien dat ik weer een Word of Excelprobleem had of ergens weer op een verkeerde toets had gedrukt en zo mijn instellingen per ongeluk had veranderd. Dankjewel dan ook voor het oplossen van al mijn PC problemen.

Maar vooral ook dankjewel voor het meezingen met de liedjes, voor het begrijpen van Kenji Minogue en voor een gedeelde voorliefde voor het getal duizend.

Verder wil ik ook heel graag mijn vrienden bedanken. Dank je wel ook voor al de afleiding tijdens dit doctoraatsproces. Of we nu toertjes gaan lopen rond de blaarmeersen, spelletjes spelen, uitgebreid brunchen, koken voor elkaar, filmavondjes houden, op weekend/reis vertrekken, of simpelweg 's goed gaan feesten, samen hebben we steeds enorm veel plezier. Dikke merci ook voor jullie betrokkenheid bij dit ganse doctoraatsproces.

Ook mijn schoonfamilie wil ik heel graag bedanken. Dankjewel voor jullie interesse in dit doctoraat. Rosanne, ik heb je krantenknipsels over obesitas nog steeds liggen ☺. Maar vooral wil ik jullie bedanken om me 9 jaar geleden te verwelkomen in jullie gezin. Het is super dat ik bij jullie met alles terecht kan. En meme Lucienne, dank je wel ook om me steeds zo te verwennen met lekkere maaltijden, je maakt de allerbeste puree ter wereld!

En natuurlijk wil ik ook graag mijn gezin bedanken. Mama en papa, grote broer en Isa, ik kan jullie niet genoeg bedanken. Jullie hebben Niels en mezelf steeds alle kansen gegeven. Ik wil jullie bedanken om mij steeds zo te stimuleren in alles, maar me tegelijkertijd toch zo vrij te laten zodat ik zelf mijn keuzes kon maken. Tijdens de studie- en doctoraatsjaren stonden jullie steeds voor me klaar en bij elk examen dat plaatsvond in de voormiddag hebben jullie me wakker gebeld zodat ik me zeker niet zou overslapen ☺. Ik vind het fantastisch om deel uit te maken van zo'n hecht gezin dat bovendien heel veel plezier kan maken. We begrijpen elkaar met een half woord en dankzij jullie mentaliteit om je altijd volledig te smijten in iets, ben ik geraakt waar ik nu ben. Ik ben dan ook ongelofelijk trots op jullie!

Tot slot, Gilles, mijn liefje, jij bent fantastisch! Dank je wel voor alle steun bij dit doctoraat. Dankzij jou weet ik dat 'niet kunnen' eigenlijk niet bestaat, enkel 'niet willen'. Je geeft me ongelofelijk veel energie en maakt me terzelfdertijd rustig wanneer ik erover ga. Je kan als geen ander relativeren en weet steeds de kleine dingen in het leven te appreciëren. Ik wil je dan ook zeker bedanken voor de fantastische tijd de voorbije 9 jaar. Plezier staat centraal bij jou, maar hoe kan het dan ook anders bij iemand die zelfs in zijn slaap hardop moet lachen. Dankjewel liefje om me er steeds voor mij te zijn op momenten dat ik het 's moeilijk had, maar vooral ook dankjewel om me quasi dagelijks te voorzien van de nodige portie humor en plezier. Ik zie je supergraag!

Elke Huyghe, 4 mei 2016, Gent

TABLE OF CONTENTS

Acknowledgements	iii
Table of contents	vii
List of tables	xi
List of figures	xii
English summary	xiii
Nederlandstalige samenvatting	xv
Chapter I: Food Marketing: Introduction and Overview	1
1. Introduction	3
2. The obesity problem	4
3. Marketing actions stimulating unhealthy food consumption	5
3.1 Price	5
3.2 Product	6
3.3 Place	8
4. Marketing actions stimulating healthy food consumption	8
4.1 Price	9
4.2 Product	10
4.3 Place	10
5. Dissertation outline	11
6. References	16
Chapter II: Can Fat Taxes And Package Size Restrictions Stimulate Healthy Food Choices?	23
1. Research background	26
2. Method	30
3. Results	30
4. References	35
5. Appendix: can fat taxes and package size restrictions stimulate healthy food choices?	36
6. References	41
Chapter III: How The Mere Presence Of Variety Fools The Mind: Effects Of Intra-Group Variety On Healthiness And Tastiness Perceptions	43
1. Introduction	46
2. Research landscape	46
3. Methods	48
4. Results	49
5. Discussion	50
6. References	52
Chapter IV: To Squeeze Or Not To Squeeze: How Squeeze Tubes Affect Consumers' Serving Sizes	55

1.	Introduction	58
2.	Theoretical background	59
	2.1 Motor fluency	59
	2.2 Ease of consumption monitoring	60
	2.3 Restrained eating	61
3.	Study 1	62
	3.1 Method	62
	3.1.1 Participants	62
	3.1.2 Procedure	63
	3.2 Results and discussion	63
4.	Study 2	65
	4.1 Method	65
	4.1.1 Participants	65
	4.1.2 Procedure	65
	4.2 Results and discussion	66
5.	Study 3	67
	5.1 Method	67
	5.1.1 Participants	67
	5.1.2 Procedure	68
	5.2 Results and discussion	68
6.	General discussion	70
	6.1 Theoretical contributions	71
	6.2 Consumer, public policy, and managerial implications	72
	6.3 Limitations and further research	73
7.	References	74
Chapter V: Clicks As A Healthy Alternative To Bricks: How Online Grocery Shopping		
Reduces Vice Purchases		77
1.	Theoretical background	81
	1.1 Differences Between Online and Offline Shopping Environments	81
	1.2 Visceral Choice of Vice Products	82
	1.3 Symbolic Versus Physical Product Presentation	83
2.	Study 1	86
	2.1 Data	86
	2.2 Results	87
	2.3 Discussion	89
3.	Study 2	91
	3.1 Method	91
	3.1.1 Participants and design.	91
	3.1.2 Procedure.	92
	3.1.3 Grocery products' vice ratings.	93
	3.1.4 Dependent variables.	93
	3.2 Results	94
	3.3 Discussion	94

4.	Study 3	95
4.1	Method	96
4.1.1	Participants and design.	96
4.1.2	Procedure.	96
4.2	Results	97
4.3	Discussion	100
5.	Study 4	101
5.1	Method	101
5.1.1	Participants and design.	101
5.1.2	Procedure.	101
5.1.3	Choice set.	102
5.2	Results	103
5.3	Discussion	104
6.	General discussion	104
6.1	Theoretical Contributions	105
6.2	Consumer, Public Policy, and Managerial Implications	107
6.3	Limitations and Further Research	108
7.	References	111
8.	Web appendix: clicks as a healthy alternative to bricks: how online grocery shopping reduces vice purchases	118
8.1	Web Appendix A. Study 1	118
8.2	Web Appendix B. Study 2	119
8.3	Web Appendix C. Study 3	124
8.4	Web Appendix D. Study 4	127
	Chapter VI: How Online Shopping Affects Private Label Food Choices	131
1.	Introduction	134
2.	Theoretical background	135
2.1	Private Label Market	135
2.2	Online Retailing	136
2.3	Private Labels in Online versus Offline Shopping Environments	137
2.4	Offline and Online Shopping Environments: Difference in Decision-Making Style	137
2.5	The Role of the Price-Quality Heuristic in Decision Making	139
3.	Study 1	141
3.1	Data	142
3.2	Results	142
3.3	Discussion	143
4.	Study 2	144
4.1	Method	144
4.1.1	Participants and design	144
4.1.2	Pretest	144
4.1.3	Procedure	145
4.2	Results	147

4.3	Discussion	148
5.	General discussion	148
5.1	Theoretical Contributions	149
5.2	Consumers and Managerial Implications	150
5.3	Limitations and Further Research	150
6.	References	152
7.	Appendix: how online shopping affects private label food choices	158
7.1	Appendix: Study 2: Product pairs examples:	158
Chapter VII: Conclusions, Contributions And Future Research		161
1.	Recapitulation of core findings	163
2.	Theoretical implications	165
3.	Practical implications	167
4.	Limitations and suggestions for future research	169
5.	References	172

LIST OF TABLES

Table 1.	Overview of the chapters and studies	14
Table 1.	Method and results of the original studies and replication study	28
Table 2.	Parameter estimates for the total sample, and men and women separately	32
Table A1.	Observed mean intention to select an indulgent option according to changes in its relative value	36
Table A2.	Observed mean intention to select a healthy option according to changes in its relative value	37
Table A3.	Parameter estimates for a model accounting for gender effects	38
Table 1.	Mixed channel customers' mean relative vice expenses at different total spending levels (study 1)	88
Table 2.	Mixed channel customers' mean relative expenses in five vice categories (study 1)	89
Table 3.	Mean store and shopping experience perceptions, and shopping time (study 3)	98
Table A1.	Single-channel customers' mean relative vice expenses at different total spending levels	118
Table A2.	Single-channel customers' mean relative expenses for five vice categories	118
Table A3.	Vice ratings for studies 2 and 3	121
Table A4.	Results manipulation check (study 3): effects of shopping channel and products' presentation mode on participants' store and shopping experience perceptions, and shopping time	126
Table A5.	Vice rating, convenience, and attractiveness mean scores for selected snacks (pretest)	128

LIST OF FIGURES

Figure 1.	Estimated and observed intention to select an indulgent option with changes in relative values	33
Figure 2.	Estimated and observed intention to select a healthy option with changes in relative values	34
Figure A1.	Estimated intentions to select the option of which the value was altered with changes in relative values for men (left panel) and women (right panel)	40
Figure 1.	Influence of intra-group variety on perceived healthiness and tastiness of healthy and unhealthy foods	49
Figure 1.	Main effect of squeeze tube vs. Traditional container on baking butter serving size (study 1)	64
Figure 2.	Main effect of squeeze tube vs. Traditional container on mayonnaise serving size, holding substance and vertical positioning constant (study 2)	67
Figure 3.	Mayonnaise serving size of squeeze tube, traditional container, and adapted squeeze tube (study 3)	69
Figure 4.	Moderated mediation model (study 3)	70
Figure 1.	Influences of product presentation mode (symbolic vs. Physical) on online and offline vice purchases (study 3)	100
Figure 2.	Serial mediation model (study 4)	104
Figure 1.	Serial mediation model (study 2)	148

ENGLISH SUMMARY

Consider a typical situation in which a consumer is standing in front of a vending machine, deciding which snack he wants to eat. He can choose between several snacks, of which some are healthy and some are unhealthy. So far, a great deal of research has been dedicated to explore what motivates consumers to choose items that are tempting and offer negative payoffs in the long run (i.e., vices) over those that are less tempting but offer positive payoffs in the long run (i.e., virtues) (e.g., Wertenbroch, 1998). In this doctoral dissertation, we will investigate how we can guide consumers towards healthy foods by making small marketing changes, such as adapting the price, the product and the place where products are presented.

In Chapter II, *Can Fat Taxes and Package Size Restrictions Stimulate Healthy Food Choices?*, we investigate how changing the (monetary) value of food products can affect consumers' food choices. In general, consumers prefer a bonus pack to a price discount. Although both promotions provide savings to consumers, promotions framed as reduced losses are perceived worse than those framed as gains (Diamond and Sanyal, 1990). Consumers tend to view bonus packs more positively because they focus on the fact that they are receiving extra of the product for free for the same price (Chandran and Morwitz, 2006). We extend research of Mishra and Mishra (2011) who show that consumers prefer a bonus pack for virtues, but prefer a price discount for vices as this choice mitigates guilt. Considering that several countries want to charge fees on foods, we examine the effect of price premiums and package size reductions next to price discounts and bonus packs. Additionally, we take different value-increasing and value-decreasing promotional levels into account and have participants choose between vices and virtues. In this chapter, we show that consumers are more responsive to price changes (i.e., price discounts and price premiums) than to package size changes (i.e., bonus packs and package size restrictions) for unhealthy options, whereas the opposite is true for healthy options.

In Chapter III, *How the Mere Presence of Variety Fools the Mind: Effects of Intra-Group Variety on Healthiness and Tastiness Perceptions*, we examine how intra-group variety influences consumers' product perceptions in terms of taste and health. Where previous research investigates variety in the overall diet (e.g., Johnson and Wardle, 2014; Vadiveloo, Dixon, Mijanovich, Elbel and Parekh, 2015), we concentrate on intra-group variety, which we define as variety within a specific product set. Our results demonstrate that

consumers perceive varied product sets as tastier. However, whereas varied (vs. non-varied) product sets are perceived as healthier when they contain healthy foods, they are seen as less healthy for unhealthy foods. Both the marginal utility framework and the classification of vices and virtues according to a good/bad dichotomy are put forward as potential explanations of the effect.

In Chapter IV, *To Squeeze or Not to Squeeze: How Squeeze Tubes Affect Consumers' Serving Sizes*, we examine the effect of package handling on serving sizes. Whereas previous studies have mainly focused on the effect of visual attributes of packages on consumer responses (e.g., Chandon and Wansink, 2002; Wansink, 1996; Harris, Schwartz and Brownell, 2009), we introduce user-friendliness as a key product differentiator and investigate if and how squeeze tubes would affect consumers' serving sizes. Therefore, we look into both the motor fluency hypothesis (i.e., bodily movements influence judgments) and the consumption monitoring hypothesis (i.e., paying attention to quantities eaten affects energy intake). In Study 1 and Study 2, we demonstrate that people use less of a product when it comes in a squeeze tube versus a traditional container and provide initial evidence for the consumption monitoring hypothesis. In Study 3, we show that the ease of consumption monitoring underlies the squeeze tube effect, which is more prominent for unrestrained eaters.

In Chapter V, *Clicks as a Healthy Alternative to Bricks: How Online Grocery Shopping Reduces Vice Purchases*, we investigate the impact of channel type (i.e., online vs. offline) on food choices. In a database study and three experimental studies we demonstrate that customers will choose fewer vices in an online environment as opposed to an offline environment. Furthermore, we show that this shopping channel effect appears because products are symbolically presented at an online website whereas they are physically presented in a brick and mortar store. Because a symbolic product presentation decreases the vividness of the products, it diminishes consumers' desire to seek instant gratification which in turn leads consumers to choose fewer unhealthy foods.

Finally, in Chapter VI, *How Online Shopping Affects Private Label Food Choices*, we explore the impact of the channel type on the preference for private label foods. More specifically, we show that online consumers will spend relatively more money on private label foods than offline consumers. Moreover, this shopping channel effect emerges because consumers' decision-making style is less intuitive online (as opposed to offline), which in turn makes them use the 'price-quality' heuristic to a lesser extent. Because online consumers are less influenced by this 'a higher price indicates a better quality' approach, they will spend relatively more money on private label foods.

NEDERLANDSTALIGE SAMENVATTING

Wanneer je zin hebt in een vieruurtje, ga je vaak op zoek naar het dichtstbijzijnde snackautomat. Daar kan je kiezen tussen zowel gezonde als ongezonde snacks. Heel wat onderzoek heeft zich reeds gericht op wat consumenten drijft om de ongezonde tussendoortjes, die wel verleidelijk zijn maar ook nadelen bieden, te verkiezen boven gezonde tussendoortjes (bv., Wertenbroch, 1999). In dit proefschrift gaan we na hoe we consumenten zo goed als mogelijk kunnen aanzetten tot het kiezen van gezonde voedingskeuzes, zonder de keuzevrijheid te ontnemen. Dit doen we door te onderzoeken hoe we door het maken van kleine veranderingen - zoals het aanpassen van de prijs van het product, het product zelf en de plaats waar het product wordt aangeboden - het keuzegedrag van consumenten kan beïnvloeden.

In hoofdstuk II zullen we onderzoeken hoe het aanpassen van de (monetaire) waarde van voedingsproducten een invloed heeft op de keuze die de consument maakt. In het algemeen verkiezen consumenten een voordeelpak boven een prijskorting. Hoewel beide promoties ervoor zorgen dat de consument kan besparen, verkiest men eerder een promotie die omschreven wordt als een ‘winst’ dan een promotie die omschreven wordt als een ‘verminderd verlies’ (Diamond en Sanyal, 1990). Dus, consumenten staan positiever ten opzichte van voordeelpakken omdat ze een deel van het product gratis ontvangen voor dezelfde prijs (Chandran en Morwitz, 2006). Wij bouwen voort op onderzoek van Mishra en Mishra (2011) dat aantoonde dat consumenten voor gezonde snacks een voordeelpak verkiezen, maar een prijskorting voor ongezonde snacks. Het kiezen van een prijskorting voor ongezonde snacks zorgt er immers voor dat de consument geld bespaart en zich dus minder schuldig voelt om een ongezond product aan te kopen. Gelet op het feit dat vele landen overwegen om taksen te heffen op ongezonde voeding, onderzoeken wij – naast het effect van voordeelpakken en prijskortingen – ook het effect van prijstoelagen en kleinere verpakkingen op de voedingskeuze van de consument. Bovendien houden we rekening met verschillende promotieniveaus en laten we de participant een keuze maken tussen een gezonde en ongezonde snack. In dit hoofdstuk tonen we aan dat veranderingen in de prijs (i.e., prijskortingen en prijstoelagen) een grotere impact hebben voor ongezonde opties terwijl veranderingen in de verpakkingsgrootte (i.e., voordeelpakken en kleinere verpakkingen) een grotere invloed hebben voor gezonde opties.

In hoofdstuk III onderzoeken we hoe intra-groep variëteit de percepties beïnvloedt zowel op vlak van gezondheid als smaak. Daar waar vorig onderzoek zich vooral gefocust heeft op de variëteit in het totale dieet (bv., Johnson en Wardle, 2014; Vadiveloo, Dixon, Mijanovich, Elbel en Parekh, 2015), richten wij ons op de intra-groep variëteit die we definiëren als de variëteit binnen een productset. Onze resultaten tonen aan dat consumenten een gevarieerde productset als lekkerder ervaren. Echter, daar waar gevarieerde (versus niet gevarieerde) productsets als gezonder ervaren worden voor gezonde opties, worden ze als minder gezond beschouwd voor ongezonde opties. Zowel het classificeren van gezonde en ongezonde voeding volgens een ‘goed/slecht’ dichotomie als de theorie van het marginale nut worden naar voren gebracht als mogelijke verklaringen van het effect.

In hoofdstuk IV bestuderen we het effect van gebruiksvriendelijke verpakkingen op de portie die men voor zichzelf kiest. Terwijl vorig onderzoek zich hoofdzakelijk heeft toegelegd op het effect van visuele attributen van verpakkingen op consumentengedrag (bv., Chandon en Wansink, 2002; Wansink, 1996; Harris, Schwartz en Brownell, 2009), introduceren wij gebruiksvriendelijkheid als een belangrijke producteigenschap. Meer bepaald zullen we nagaan of het gebruiken van een knijpfles de portie beïnvloedt. Hierbij zullen we zowel de ‘motor fluency hypothese’ (i.e., hoe men zich beweegt heeft een impact op de keuze die men maakt) als de ‘consumption monitoring hypothese’ (i.e., aandacht besteden aan hoeveel men aan het consumeren is, beïnvloedt de uiteindelijke consumptie) in overweging nemen. In Studie 1 en Studie 2 tonen we aan dat consumenten minder van een product zullen gebruiken wanneer het wordt aangeboden in een knijpfles versus een traditionele verpakking. In Studie 3 tonen we aan dat het gemak van monitoren het knijpfles-effect verklaart, dat tevens sterker aanwezig is voor consumenten die eerder een zorgeloze relatie hebben met voeding.

In hoofdstuk V onderzoeken we het effect van het kanaaltype (i.e., online versus offline winkelen) op voedingskeuzes. In een database studie en drie experimentele studies tonen we aan dat online consumenten minder ongezonde voeding zullen aankopen dan offline consumenten. Bovendien laten we zien dat dit effect zich voortdoet omdat producten op een symbolische manier (i.e., foto’s) worden weergegeven in de online winkel terwijl ze fysiek aanwezig zijn in de offline winkel. Die symbolische product presentatie zorgt ervoor dat de producten als minder levendig (i.e., less vivid) worden ervaren wat ervoor zorgt dat het verlangen naar ongezonde producten afgezwakt wordt en men minder ongezonde producten koopt online.

In het laatste empirisch hoofdstuk, hoofdstuk VI, bestuderen we hoe de invloed van het kanaaltype een effect heeft op de voorkeur voor huismerken. Meer bepaald laten we zien dat

consumenten online relatief gezien meer geld zullen spenderen aan huismerken in vergelijking met offline. Bovendien doet dit effect zich voor omdat de beslissingsstijl van consumenten online minder intuïtief verloopt wat er voor zorgt dat men zich minder beroept op de ‘een hoge prijs betekent een hoge kwaliteit’ heuristiek. Dit leidt er uiteindelijk toe dat men online relatief gezien meer zal spenderen aan huismerken.

CHAPTER I:
FOOD MARKETING: INTRODUCTION AND OVERVIEW

CHAPTER I: FOOD MARKETING: INTRODUCTION AND OVERVIEW

1. INTRODUCTION

There is a vast consensus that overweight and obesity are an immense, international health problem (WHO, 2014). Empirical evidence demonstrates that a sedentary lifestyle (e.g., Pratt, Macera & Wang, 2000) and a higher energy intake (e.g., Cutler, Glaeser & Shapiro, 2003; Swinburn, Sacks & Ravussin, 2009) contribute to the widespread obesity epidemic. In this doctoral dissertation, we solely focus on energy intake. As a matter of fact, intake and caloric supply increased extensively in parallel with overweight and obesity prevalence (Putnam, Allshouse & Kantor, 2002). Snacks, soft drinks, and food consumed at fast food restaurants have been recognized as a few causes for this trend (Nielsen & Popkin, 2003) and a considerable amount of studies determined that regularly consuming these unhealthy products explains the obesity prevalence in the US (e.g., Hill, Wyatt, Reed & Peters, 2003; Katan & Ludwig, 2010) and Western OECD countries (e.g., Bleich, Cutler, Murray & Adams, 2008).

Food preferences are highly influenced by habits (Nu, MacLeod & Barthelemy, 1996). For example, insects are eaten with great enjoyment in some cultures while they are despised in others. However, also the food industry plays an important role in our current food environment as it can determine which food is acceptable and desirable to eat. Consequently, food marketers have been pointed at for being partly responsible for the obesity epidemic (Kessler, 2009; Nestle & Nesheim, 2012; Popkin, 2009). Research investigating the prevalence of food advertising shows that food marketing is enormous and mainly consists for unhealthy foods (Harris, Pomeranz, Lobstein & Brownell, 2009). Although advertising automatically comes to mind when thinking of marketing, more subtle marketing actions can also influence consumers unconsciously to eat more of unhealthy products. For example, by altering package and portion sizes, marketers can spur consumption. Research of Wansink (1996) shows that participants ate more M&M's candy from a medium than from a small sized pack.

Fortunately, there is a recent research trend towards the use of subtle marketing actions to nudge consumers to healthier choices. In this respect, nudging consists of making slight changes in the consumer environment to guide consumers to more desirable choices, but without forcing them (Thaler & Sunstein, 2008). The main objective of this doctoral

dissertation is to investigate how we can contribute to this nudging trend by exploring and testing which subtle marketing actions can help consumers to make healthier choices. As such, we do not focus on obtrusive marketing actions such as *Promotion* to encourage healthy foods consumption. More specifically, we will focus on 3 of the 4 P's: *Price*, *Product* and *Place* and investigate how subtle changes such as altering prices and package sizes (Chapter II: *Price*), making little changes in an assortment of food (Chapter III: *Product*), adapting the product's ease of use (Chapter IV: *Product*), and changing the channel type - offline versus online shopping - to present foods (Chapter V & VI: *Place*) can help consumers to make healthier food choices.

In what follows, we briefly discuss the obesity problem and give an overview - based on the 4 P's framework - of how (subtle) marketing tactics tempt consumers to consume more unhealthy foods. Next, we illustrate the recent research trend of nudging consumers towards healthy foods. To conclude, we point out how this doctoral dissertation can contribute to this recent trend and shortly introduce our studies.

2. THE OBESITY PROBLEM

During the past decades, the prevalence of overweight and obesity has risen dramatically in the United States and in most other developed countries (WHO, 2014). The World Health Organization specifies overweight in adults as having a body mass index or BMI (which is calculated as weight in kilograms divided by height in meters squared) between 25 and 30, and defines overweight in youth as a weight-for-height that ranges between the 85th and 95th percentile of a reference distribution. Obesity in adults is specified as a body mass index or BMI of 30 or higher while obesity in youth is defined as a weight-for-height that exceeds the 95th percentile of a reference distribution (WHO, 2000). In 2014, 39% of adults or 1.3 billion adults were overweight and 13% of adults or 600 million adults were obese (WHO, 2014).

These high obesity figures lead to several health consequences. Research shows that obesity increases the risk of developing diabetes mellitus, sleep apnea and cardiovascular diseases (Pi-Sunyer, 1991). Furthermore, obesity is strongly correlated with a reduced life expectancy (Stewart, Cutler & Rosen, 2009). Besides the health consequences, obesity is associated with lower productivity rates (Bernaards, Proper & Hildebrandt, 2007), lower incomes (Levine, 1995) and substantial health care costs (Allison, Zannolli & Narayan, 1999).

These severe consequences have led to a worldwide attention to the obesity epidemic (Moore 2007). Government agencies, and nutrition and marketing literature streams all point to the increasing food portion sizes as a potential contributing factor to the rising obesity rates (Centers for Disease Control and Prevention 2004; Chandon & Wansink 2011; Rolls 2003; Steenhuis & Vermeer 2009). Hill et al. (2003) suggested that a slight increase in consumers' energy intake of 50 to 100 kcal each day is sufficient to account for the rise in obesity. Thus, even small changes in energy intake over time can have profound effects.

3. MARKETING ACTIONS STIMULATING UNHEALTHY FOOD CONSUMPTION

Marketing budgets are largely spent on print, online and television advertising. When it comes to television advertising, one-third is represented by food advertising (Desrochers & Holt, 2007). Moreover, research shows that the largest part of food advertising on television promotes foods that are high in calories but low in nutrition, such as candy, cereals and fast food (Batada, Seitz, Wootan & Story, 2008; Harris et al., 2009). Such repeated exposure to unhealthy foods may increase the likelihood that these foods are chosen (Gorn & Goldberg, 1982). Especially among obese individuals exposure to food advertisements may lead to an increase in energy intake (Halford et al., 2008).

However, researchers believe that obtrusive marketing such as food advertising is just a tip of the iceberg (e.g., Chandon & Wansink, 2012). Indeed, other marketing actions such as adapting prices, altering package and portion sizes, changing the food environment etc., may also have a significant impact on unhealthy food consumption. In what follows, we provide an overview of how these more subtle marketing actions may have contributed to the obesity epidemic, using the 3 remaining P's: *Price*, *Product*, and *Place*.

3.1 Price

Marketers can modify prices which in turn can influence consumption intake. For example, longitudinal field experiments in cafeterias have found that a price cut of more than 25% significantly influences consumption: children consumed more beverages and snacks, but also fruit and vegetables (Block, Chandra, McManus & Willett, 2010; French & Stables, 2003). Also the relative price of food can be reduced by offering quantity discounts with larger package sizes. Several studies found that quantity discounts generally lead to

stockpiling and an increase in consumption, especially for overweight consumers (Neslin & Van Heerde, 2009; Vermeer, Alting, Steenhuis & Seidell, 2010).

Also the payment mode can influence energy consumption. When shopping for groceries, consumers can choose to buy vices, virtues or a mix of both. By definition, vice foods are tempting products that typically render short-term benefits (e.g., tastiness), but have fewer long-term benefits (e.g., healthiness; Khan and Dhar, 2007; Wertenbroch, 1998). The opposite holds true for virtue foods. Research of Thomas, Desai and Seenivasan (2011) shows that consumers buy more vices when paying via credit card than via cash. Because paying in cash is more painful, it can curb impulsive urges and lead consumers to buy less unhealthy foods.

3.2 Product

Marketers are also closely involved with product development decisions regarding the quality and quantity of the product which in turn can influence consumption. For example, research demonstrates that increasing the amount of fat, salt and sugar to a certain amount makes food more palatable and as such, increases consumption (Sorensen, Moller, Flint, Martens & Raben, 2003; Stubbs & Whybrow, 2004; Drewnowski, 2007). Consequently, food marketers have increased the supply of food rich in fat or added sugar, such as sweetened beverages (Putnam et al., 2002). Not only adding extra unhealthy ingredients, but also changing the substance of the food can affect consumption. De Graaf and Kok (2010) showed that liquid foods (e.g., apple juice) contain more calories than similar solid 'slow' foods (e.g., apples) of the same energy density. Moreover, because a shorter sensory exposure and a lower bite effort postpone satiation, consumers tend to eat more from liquid than from similar solid foods of the same energy density.

Also color can exert a significant effect when it comes to foods. A study of Hoegg and Alba (2007) showed that participants perceived a greater difference in the taste of two identical samples of orange juice when the juice of one of the samples was made darker (Hoegg & Alba, 2007).

Besides changes to the product itself, food marketers may also increase the actual variety of food offered. Research has shown that increasing variety, both within and across meals, increases consumption intake because it reduces sensory-specific satiety (Inman, 2001; Khare & Inman, 2006). Sensory-specific satiety refers to the decreased pleasure that one

experiences when consuming the same food (e.g., Rolls, 1986). Thus, when offering a variety of foods, sensory-specific satiety can be reduced.

Also by changing the perceived variety through the actual variety of an assortment, food marketers can influence consumption. For example, Redden and Hoch (2009) found that variety in an assortment decreases the perceived quantity of that assortment, against common intuition. In their study, participants were told that the researchers were interested in how quickly consumers can pour servings of candy. Subsequently, they were shown a sample of brown colored M&M's candies in a plastic bowl. When the sample was removed, the participants had to pour candies (single colored M&M's candies or a mixture of colors of the M&M's candies) in a cup until it matched the sample they were shown. Participants who had to pour multiple color candies poured larger portions than participants who poured single color candies because the mixture of colors decreased the quantity perceptions. They explain their results via the Gestalt Theory: identical items can form a Gestalt and as such make the assortment seem bigger. Moreover, Kahn and Wansink (2004) showed that also the organization of an assortment is important. In their study, participants were offered an assortment of jelly beans which tasted the same but differed in number of colors (6 vs. 24) and in organization type (organized vs. disorganized assortment). In the disorganized assortments, participants ate the same amount of candies, regardless whether the assortment contained 6 or 24 jelly beans. However, in the organized assortments, participants ate more jelly beans when the assortment contained 24 versus 6 colors. As it becomes more difficult to estimate the level of actual variety with disorganized assortments, increasing the number of colors of the candies had only an effect in organized assortments.

Finally, besides influencing the variety of foods, food marketers have also changed the package size of foods. Research that looks at the effect of package size on consumption points in two directions. On the one hand, there is ample research that shows that larger package and serving sizes lead to an increase in consumption (Chandon & Wansink, 2002; Fisher & Kral, 2008; Rolls, Engell & Birch, 2000; Wansink, 1996). Even for foods that have a bad taste, such as 14-day old popcorn, supersize, larger servings spur consumption (Wansink & Kim, 2005). On the other hand, plenty of research shows that decreasing the package size does not always reduce consumption but also can induce consumers to eat more (e.g., Coelho do Vale, Pieters & Zeelenberg, 2008; Scott, Nowlis, Mandel & Morales, 2008). For example, whereas restrained eaters perceive a self-control conflict for large food morsels in large packages, the self-control conflict is lower when small food morsels are presented in small packages. As a result, these restrained eaters overconsume small food in small packages (Scott et al., 2008).

3.3 Place

Another subtle way to influence food intake is by changing the eating environment. In the past decades, fast food restaurants have become ubiquitous. While spending on food to eat at home remained stable between 1982 and 2007, consumers' spending on away-from-home foods increased by 16% (Shames, 2009). Restaurants, as well as retailers, can easily change ambient characteristics of the environment (i.e., the point of consumption or the point of purchase) such as the lighting, the odor, and the music. Research has shown that warm lighting may extend eating duration and consequently affect energy intake consumption, whereas harsh lighting makes consumers eat faster (Stroebele & de Castro, 2004). Also ambient odors can play a significant role. For example, Guéguen and Petr (2006) investigated the effect of ambient odors on consumption at a restaurant. They found that exposure to a lavender aroma made consumers spend more money and stay longer in the restaurant as this lavender aroma had a relaxing effect. Also the influence of music on food intake has been investigated and it is found that the presence of background music leads to a higher food intake and longer meal duration (Stroebele & de Castro, 2006) while the tempo of the music increases the number of bites (Roballey et al., 1985).

4. MARKETING ACTIONS STIMULATING HEALTHY FOOD CONSUMPTION

To date much research has investigated the potential negative effects of advertising for unhealthy food while relatively little attention has been devoted to counter-advertising strategies to encourage healthy eating among consumers (e.g., Batada et al., 2008; Harris et al., 2009). In 2007, the Kaiser Family Foundation conducted a large study on food advertising on television and showed that children between 8 and 12 years old are exposed to about 21 ads each day. The majority of these ads were for unhealthy foods and none of the 8854 ads reviewed marketed fruits and vegetables. Kaufman and Sandman (1983) investigated the effect of both unhealthy and healthy food advertisements on food choices, but in an experimental setting. They found that children exposed to advertisements for healthy foods made healthier choices (i.e., they chose roughly 60% healthy foods) than children who were exposed to unhealthy advertisements (i.e., they chose roughly 50% healthy foods).

Regrettably, advertising for healthy foods is scarce and so is research that investigates healthy food advertising. However, a recent paper of Roose, Geuens and Vermeir (2016) examined 162 healthy food print ads and 161 unhealthy food print ads by looking at the fit

between the healthy (vs. unhealthy) ads and the regulatory focus of the Western consumer. They found that the unhealthy food ads were mainly promotion focused and so were the consumers. Unhealthy food ads thus showed a better fit with Western consumers than healthy ads which were mainly prevention focused.

Nowadays, there is a recent trend towards nudging consumers to healthy foods by means of other, more subtle ways than advertising. As consumers make food choices in an environment in which many cues may influence their choices, both the product and environment in which consumers make their food choices are being reshaped (Bodor, Ulmer, Dunaway, Farley & Rose, 2010). This ‘nudging’ endeavors to make healthy choices more appealing (Ratner et al., 2008). A key characteristic of nudging is that consumers are still free and will not be forced to make a particular choice (Thaler & Sunstein, 2008). Below, we provide an overview of how nudging can affect healthy food choices, using the 3 remaining P’s: *Price*, *Product*, and *Place*.

4.1 Price

A large body of research shows that nutrient-rich, low-energy-dense foods such as fruits and vegetables are generally more expensive than high-energy-dense foods such as snacks and fast food. Therefore, consumers with a low socio-economic status can experience financial barriers to a healthy lifestyle (e.g., Drewnowski, 2004). Furthermore, a study with low-income consumers showed that these consumers hold a negative perception towards the price of fruit and vegetables in particular (Inglis, Ball & Crawford, 2005). Fortunately, several researchers investigated how they could nudge consumers towards healthier foods by adapting price strategies. For example, French (2003) showed that price reductions of 10%, 25% and 50% on lower fat snacks led to an increase in sales of 9%, 39% and 93%. Moreover, a price cut of more than 25% increased children’s consumption of fruit and vegetables among other things (Block, Chandra, McManus & Willett, 2010; French & Stables, 2003). Also taxes on food can be a means to discourage the purchase of unhealthy foods. These taxes can be divided in three groups (Clark & Dittrich, 2010). First, the ‘food group tax’ imposes the same tax rate across a particular food group because it is perceived that this group has a high fat content (e.g., fried snacks). Second, the ‘nutrient tax’ imposes a tax on the nutrient content (e.g., grams of sugar) of food regardless of the food group. Third, the ‘nutrient index tax’, which is similar to the nutrient tax but differs because a weighted average is taxed instead of individual nutrients. However, scientific evidence is mixed about their effects as consumers

tend to replace more expensive unhealthy foods by cheaper alternatives (e.g., Clarck, Dittrich & Xu, 2014, Nederkoorn, Havermans, Giesen & Jansen, 2011).

4.2 Product

To the best of our knowledge, no research has been conducted on the effectiveness of changing the healthy product itself. However, when it comes to changing the product packaging of healthy products, marketers have several options. Research has shown that simple health claims, such as color-coded traffic lights, can have significant effects on healthy food choices (e.g., Andrews, Burton & Kees, 2011). Thorndike, Sonnenberg, Riis, Barraclough and Levy (2012) showed in a field experiment that color coding of cafeteria foods with a red, yellow, or green label (for “unhealthy,” “less healthy,” and “healthy” foods) reduced the sales of unhealthy items and increased the sales of healthy items).

Also adding information about the recommended serving sizes can be beneficial. Wansink and Chandon (2006) found that providing serving size information reduced consumption. Geier, Wansink and Rozin (2012) show that even “virtual” serving sizes can affect energy intake. By adding unobtrusive partitions (e.g., a red Pringle chip between every seven yellow ones in a tube) consumers likely decrease their consumption. However, this obtrusive partitioning may only work when consumers are paying attention to the partition.

Consumers can also be nudged towards healthier options through changes in the package size. A study of Chandon and Ordabayeva (2009) showed that when consumers had to choose between a downsized and a regular size package, consumers will be more likely to choose the downsized product when it is downsized in three dimensions as opposed to one dimension. This because the size decrease in the three-dimensional condition will appear smaller than the one in the one-dimensional condition.

4.3 Place

Finally, changing the food location and food environment can also influence consumption. For example, research shows that proximity to convenience stores was linked to a higher BMI and overweight, whereas a greater availability of chain supermarkets was correlated with a lower BMI, probably because such supermarkets offer more healthy foods (Powell, Auld & Chaloupka, O’Malley, & Johnston, 2007). Furthermore, in a study of Downs, Loewenstein and Wisdom (2009), the accessibility of (un)healthy foods was

manipulated on menus at a fast food restaurant. It was found that consumers chose more healthy foods when these were put on the front-page rather than on the back-page. Displaying healthy foods more conspicuously in cafeterias of school lunchrooms while combining it with color-coded labeling – for example by placing healthy foods with a green label on eye-level shelves – also increased sales of healthy foods (Thorndike et al., 2012). Hanks, Just, Smith and Wansink (2012) demonstrated that providing a convenience line displaying only healthy foods (i.e., this line contained a healthy-items-only service with quick and easy healthy foods such as fruits etc.) in a school lunch room boosted the sales of healthy foods by 18% while decreasing the sales of unhealthy foods by almost 28%. Further, Maas, de Ridder, de Vet and de Wit (2012) altered the distance to unhealthy snacks in a lab experiment. Their results show that putting snacks further away lowers the likelihood on and the amount of snack intake. Also Meyers and Stunkard (1980) manipulated the accessibility of unhealthy foods. They found that both low-calorie and high-calorie desserts were chosen less often when they were made less accessible. Van Kleef, Otten and van Trijp (2012) showed that – when an assortment consisted of 75% healthy snacks and 25% unhealthy snacks (versus 25% healthy snacks and 75% unhealthy snacks) – more healthy snacks were chosen, even though both assortments were rated as equally satisfying.

5. DISSERTATION OUTLINE

It is clear now that a large body of research has demonstrated that little changes in the food environment can stimulate healthy or unhealthy food consumption. With this dissertation, we want to contribute to nudging research by exploring and investigating which subtle marketing cues can guide consumers towards more healthy food choices. In what follows, we provide an overview of the topics that will be discussed in the subsequent chapters of this dissertation: in Chapter II, we focus on *Price*, in Chapters III and IV we concentrate on *Product* and finally, in Chapters V and VI we look at how *Place* can affect consumers' choices (see Table 1 for an overview).

Chapter II, *Can Fat Taxes and Package Size Restrictions Stimulate Healthy Food Choices?*, extends research by Mishra and Mishra (2011), who show that consumers prefer a price discount for unhealthy foods and a bonus pack for healthy foods. By offering three extensions – 1) we consider price premiums and package reductions next to price discounts and bonus packs, 2) participants choose between the healthy and unhealthy option, and 3) we

look at different value-increasing and value-decreasing promotional levels – we conceptually replicate and extend Mishra and Mishra’s findings and show that consumers are more responsive to changes in price than to changes in package size for unhealthy options, whereas the opposite is true for healthy options.

In Chapter III, *How the Mere Presence of Variety Fools the Mind: Effects of Intra-Group Variety on Healthiness and Tastiness Perceptions*, we investigate how intra-group variety (i.e., variety within a product set), influences consumers’ product perceptions in terms of taste and health. Our results show that consumers perceive varied product sets as tastier. Yet, whereas varied (vs. non-varied) product sets are perceived as healthier when they contain healthy foods, they are seen as less healthy for unhealthy foods.

In Chapter IV, *To Squeeze or Not to Squeeze: How Squeeze Tubes Affect Consumers’ Serving Sizes*, we examine if and how squeeze tubes would influence consumers’ serving sizes. Therefore, we contrast the motor fluency hypothesis (i.e., bodily movements affect judgments) with the consumption monitoring hypothesis (i.e., paying attention to quantities eaten influences energy intake). In Study 1 and Study 2, we show that consumers use less of a product when it comes in a squeeze tube versus a traditional container and provide initial evidence for the consumption monitoring hypothesis. Study 3 shows that the ease of consumption monitoring drives the squeeze tube effect, which is more prominent for unrestrained eaters.

In Chapter V, *Clicks as a Healthy Alternative to Bricks: How Online Grocery Shopping Reduces Vice Purchases*, we investigate how the channel type (i.e., online vs. offline) where food is presented can affect food choices. In a database study and three experimental studies we show that consumers will choose fewer unhealthy foods in an online environment as opposed to an offline environment. Furthermore, we demonstrate that this shopping channel effect appears because products are symbolically presented at an online website whereas they are physically presented in a brick and mortar store. Because a symbolic product presentation decreases the vividness of the products, it diminishes consumers’ desire to seek instant gratification which in turn leads consumers to choose fewer unhealthy foods.

In Chapter VI, *How Online Shopping Affects Private Label Food Choices*, we demonstrate that online consumers will spend relatively more money on private label foods than offline consumers. Moreover, this shopping channel effect emerges because consumers’ decision-making style is less intuitive online (as opposed to offline), which in turn leads to a less extensive use of the ‘price-quality’ heuristic. Because online consumers are less

influenced by this 'a higher price stands for better quality approach', they will spend relatively more money on private label foods.

Table 1: Overview of the Chapters and Studies

Chapter	Study	4 P's Framework	Dependent Variables	Foods
Chapter II	Study 1	Price	Choice	Healthy - unhealthy food pairs (e.g., granola bar - chocolate cookie)
Chapter III	Study 1	Product	Healthiness Tastiness	Healty foods: bell peppers Unhealthy foods: salty nuts
Chapter IV	Study 1	Product	Serving size	Baking butter: squeeze tube and traditional container
	Study 2	Product	Serving size User-friendliness Healthiness Package experience	Mayonnaise: squeeze tube and traditional container
	Study 3	Product	Serving size Consumption monitoring Restrained eating	Mayonnaise: squeeze tube, adapted squeeze tube and traditional container
Chapter V	Study 1	Place	Relative amount of money spent on vices	Unhealthy foods: salty snacks, chocolate, candy bars, chips, sweets and chewing gum
	Study 2	Place	$Index_{AverageViceRatings}$ $Index_{Weighted-AverageViceRatings}$	Mix of unhealthy and healthy foods: snacks, fruit, vegetables, dairy, drinks,...

Study 3	Place	<p>$\text{Index}_{\text{AverageViceRatings}}$</p> <p>$\text{Index}_{\text{Weighted-AverageViceRatings}}$</p> <p>Store perceptions</p> <p>Shopping experience</p> <p>Assortment perceptions</p>	<p>Mix of unhealthy and healthy foods:</p> <p>snacks, fruit, vegetables, dairy, drinks,...</p>
Study 4	Place	<p>Choice</p> <p>Vividness</p> <p>Immediate gratification</p>	<p>Mix of 12 healthy and unhealthy snacks:</p> <p>fruit, candy bars, granola bars,...</p>
Chapter VI	Study 1	Place	<p>Relative amount of money spent on private labels</p> <p>Unhealthy foods:</p> <p>salty snacks, chocolate, candy bars, chips, sweets and chewing gum</p>
	Study 2	Place	<p>Relative amount of money spent on private labels</p> <p>Intuitive decision-making style</p> <p>Price-quality heuristic</p> <p>Mix of unhealthy and healthy foods:</p> <p>snacks, fruit, vegetables, dairy, drinks,...</p>

6. REFERENCES

- Allison, D.B., Zannolli, R., & Narayan, K.V. (1999). The direct health care costs of obesity in the United States. *American Journal of Public Health, 89*(8), 1194–1199.
- Andrews, J.C., Burton, S., & Kees, J. (2011). Is simpler always better? Consumer evaluations of front-of-package nutrition symbols. *Journal of Public Policy & Marketing, 30*(2), 175–190.
- Batada, A., Seitz, M.D., Wootan, M.G., & Story, M. (2008). Nine out of 10 food advertisements shown during Saturday morning children’s television programming are for foods high in fat, sodium, or added sugars, or low in nutrients. *Journal of the American Dietetic Association, 108*(4), 673–678.
- Bernaards, C.M., Proper, K.I., & Hildebrandt, V.H. (2007). Physical activity, cardiorespiratory fitness, and body mass index in relationship to work productivity and sickness absence in computer workers with preexisting neck and upper limb symptoms. *Journal of Occupational and Environmental Medicine, 49*(6), 633-640.
- Bleich, S., Cutler, D., Murray, C., & Adams, A., (2008). Why is the developed world obese? *Annual Review of Public Health, 29*, 273–295.
- Block, J.P., Chandra, A., McManus, K.D., & Willett, W.C. (2010). Point-of-purchase price and education intervention to reduce consumption of sugary soft drinks. *American Journal of Public Health, 100*(8), 1427–1433.
- Bodor, J.N., Ulmer, V.M., Futrell Dunaway, L., Farley, T.A., Rose, D. (2010). The rationale behind small food store interventions in low-income urban neighborhoods: insights from New Orleans. *The Journal of Nutrition, 140*(6), 1185–1188.
- Centers for Disease Control and Prevention (2004). Trends in intake of energy and macronutrients: United States 1971– 2000. *Morbidity and Mortality Weekly Report, 53*(4), 80–82.
- Chandon, P. & Wansink, B. (2002). When are stockpiled products consumed faster? A convenience–salience framework of postpurchase consumption incidence and quantity. *Journal of Marketing Research, 39*(3), 321–335.
- _____ & _____ (2011). Is food marketing making us fat? A multi-disciplinary review. *Foundations and Trends in Marketing, 5*(3), 113–196.
- _____ & _____ (2012). Does food marketing need to make us fat? A review and solutions. *Nutrition Reviews, 70*(10), 571–593.

- _____ & Ordabayeva, N. (2009). Supersize in one dimension, downsize in three dimensions: Effects of spatial dimensionality on size perceptions and preferences. *Journal of Marketing Research*, 46(6), 739–753.
- Clark, J.S. & Dittrich, O.L. (2010). Alternative fat taxes to control obesity. *International Advances in Economic Research*, 16(4), 388-394.
- _____, _____, & Xu, Q. (2014). Empirical evidence of the efficiency and efficacy of fat taxes and thin subsidies. *Central European Journal of Public Health*, 22(3), 201.
- Coelho Do Vale, R. C., Pieters, R., & Zeelenberg, M. (2008). Flying under the radar: Perverse package size effects on consumption self-regulation. *Journal of Consumer Research*, 35(3), 380–390.
- Cutler, D.M., Glaeser, E.L., & Shapiro, J.M. (2003). Why have Americans become more obese? Cambridge, MA: Harvard Institute of Economic Research.
- de Graaf, C. & Kok, F.J. (2010). Slow food, fast food and the control of food intake. *Nature Review Endocrinology*, 6(5), 290–293.
- Desrochers, D M. & Holt, D.J. (2007). Children’s exposure to television advertising: Implications for childhood obesity. *Journal of Public Policy & Marketing*, 26(2), 182–201.
- Downs, J.S., Loewenstein, G. & Wisdom, J. (2009). Strategies for promoting healthier food choices. *American Economic Review*, 99(2), 159–164.
- Drewnowski, A. (2004). Obesity and the food environment: dietary energy density and diet costs. *American Journal of Preventive Medicine*, 27(3), 154–162.
- _____ (2007). The real contribution of added sugars and fats to obesity. *Epidemiologic Reviews*, 29(1), 160–171.
- Fisher, J.O. & Kral, T.V.E. (2008). Super-size me: Portion size effects on young children’s eating. *Physiology & Behavior*, 94(1), 39–47.
- French, S.A. (2003). Pricing effects on food choices. *The Journal of Nutrition*, 133(3), 841S–843S.
- _____ & Stables, G. (2003). Environmental interventions to promote vegetable and fruit consumption among youth in school settings. *Preventive Medicine*, 37(6), 593–610.
- Geier, A., Wansink, B. & Rozin, P. (2012). Red potato chips: Segmentation cues can substantially decrease food intake. *Health Psychology*, 31(3), 398.
- Gorn, G. J. & Goldberg, M.E. (1982). Behavioral evidence of the effects of televised food

- messages on children. *Journal of Consumer Research*, 9(2), 200–205.
- Guéguen, N. & Petr, C. (2006). Odors and consumer behavior in a restaurant. *International Journal of Hospitality Management*, 25(2), 335–339.
- Halford, J.C.G., Boyland, E.J., Hughes, G.M., Stacey, L., McKean, S., & Dovey, T.M. (2008). Beyond-brand effect of television food advertisements on food choice in children: The effects of weight status. *Public Health Nutrition*, 11(9), 897–904.
- Hanks, A.S., Just, D.R., Smith, L.E., Wansink, B. (2012). Healthy convenience: nudging students toward healthier choices in the lunchroom. *Journal of Public Health*, 34(3), 370–376.
- Harris, J.L., Pomeranz, J.L., Lobstein, T., & Brownell, K.D. (2009). A crisis in the marketplace: How food marketing contributes to childhood obesity and what can be done. *Annual Review of Public Health*, 30, 211–225.
- Hill, J.O., Wyatt, H.R., Reed, G.W., & Peters, J.C. (2003). Obesity and the environment: Where do we go from here? *Science*, 299(5608), 854–855.
- Hoegg, J. & Alba, J.W. (2007). Taste perception: More than meets the tongue. *Journal of Consumer Research*, 33(4), 490–498.
- Kahn, B. E. & Wansink, B. (2004). The influence of assortment structure on perceived variety and consumption quantities. *Journal of Consumer Research*, 30(4), 519–533.
- Kaiser Foundation. (2004). The role of media in childhood obesity. Henry J. Kaiser Family Foundation.
- Katan, M.B., & Ludwig, D.S. (2010). Extra calories cause weight gain – but how much? *Journal of the American Medical Association*, 303(1), 65–66.
- Kaufman, L., & Sandman, P.M. (1983). Countering Children's Sugared Food Commercials: Do Rebuttals Help?
- Kessler, D.A. (2009). The end of overeating: Taking control of the insatiable American appetite. New York: Rodale.
- Khan, U. & Dhar, R. (2007). Where there is a way, is there a will? The effect of future choices on self-control. *Journal of Experimental Psychology*, 136(2), 277–288.
- Khare, A. & Inman, J.J. (2006). Habitual behavior in American eating patterns: The role of meal occasions. *Journal of Consumer Research*, 32(4), 567–575.
- Inglis, V., Ball, K., & Crawford, D. (2005). Why do women of low socioeconomic status have poorer dietary behaviours than women of higher socioeconomic status? A qualitative exploration. *Appetite*, 45(3), 334–343.
- Inman, J. J. (2001). The role of sensory-specific satiety in attribute- level variety seeking.

- Journal of Consumer Research*, 28(1), 105–120.
- Levine, A.A. (1995). Obesity and income: The effect of overweight on wages in women. *Journal of Pediatric Gastroenterology and Nutrition*, 20(3), 354–355.
- Maas, J., de Ridder, D.T., de Vet, E. & de Wit, J.B. (2012). Do distant foods decrease intake? The effect of food accessibility on consumption. *Psychology & Health*, 27(2), 59–73.
- Meyers, A.W. & Stunkard, A.J. (1980). Food accessibility and food choice. A test of Schachter's externality hypothesis. *Archives of General Psychiatry*, 37(10), 1133–1135.
- Mishra, A. & Mishra, H. (2011). The influence of price discount versus bonus pack on the preference for virtue and vice foods. *Journal of Marketing Research*, 48(1), 196–206.
- Moore, E.S. (2007). Perspectives on food marketing and childhood obesity: Introduction to the special section. *Journal of Public Policy & Marketing*, 26(2), 157–161.
- Nederkoorn, C., Havermans, R.C., Giesen, J.C., & Jansen, A. (2011). High tax on high energy dense foods and its effects on the purchase of calories in a supermarket: an experiment. *Appetite*, 56(3), 760–765.
- Neslin, S.A. & Van Heerde, H.J. (2009). Promotion Dynamics. *Foundations and Trends in Marketing*, 3(4), 177–268.
- Nestle, M., & Nesheim, M.C. (2012). Why calories count : from science to politics. Berkeley: University of California Press.
- Nielsen, S.J. & Popkin, B.M (2003). Patterns and trends in food portion sizes, 1977–1998. *Journal of the American Medical Association*, 289(4), 450–453.
- Nu, C.T., MacLeod, P., & Barthelemy, J. (1996). Effects of age and gender on adolescents' food habits and preferences. *Food quality and preference*, 7(3), 251-262.
- Pi-Sunyer, F.X. (1991). Health implications of obesity. *The American Journal of Clinical Nutrition*, 53(6), 1595S–1603S.
- Popkin, B.M. (2009). The world is fat: The fads, trends, policies, and products that are fattening the human race. New York: Avery.
- Powell, L.M., Auld, M.C., Chaloupka, F.J., O'Malley, P.M. & Johnston, L.D. (2007). Associations between access to food stores and adolescent body mass index. *American Journal of Preventive Medicine*, 33(4, Supplement 1), S301–S307.
- Pratt, M.J., Macera, C.A., & Wang, G. (2000). Higher direct medical costs associated with physical inactivity. *The Physician and Sportsmedicine*, 28(10), 63–70.
- Putnam, J., Allshouse, J., & Kantor, L.S. (2002). U.S. per capita food supply trends: More calories, refined carbohydrates, and fats. *Food Review* 25(3), 2–15.

- Ratner, R.K, Soman, D., Zauberaman, G., Ariely, D., Carmon, Z., Keller, P.A., Kim, B.K., Lin, F., Malkoc, S., Small, D.A., & Wertenbroch, K. (2008). How behavioral decision research can enhance consumer welfare: From freedom of choice to paternalistic intervention. *Marketing Letters*, 19(3-4), 383-397.
- Redden, J.P. & Hoch, S.J. (2009). The presence of variety reduces perceived quantity. *Journal of Consumer Research*, 36(3), 406–417.
- Roballey, T.C., McGreevy, C., Rongo, R.R., Schwantes, M.L., Steger, P.J., Wininger, M.A., & Gardner, E.B. (1985). The effect of music on eating behavior. *Bulletin of Psychonomic Society*, 23(3), 221-222.
- Rolls, B. J. (1986). Sensory-specific satiety. *Nutrition Review*, 44(3), 93–101.
- _____, (2003). The supersizing of America: Portion size and the obesity epidemic. *Nutrition Today*, 38(2), 42– 53.
- _____, Engell, D., & Birch, L.L. (2000). Serving portion size influences 5-year-old but not 3-year-old children’s food intakes. *Journal of the American Dietetic Association*, 100(2), 232–234.
- Roose, G., Geuens, M., and Vermeir, I. (2016). Healthy food ads ‘prevent’ whereas unhealthy food ads ‘promote’: Time for a change? A content analysis of healthy and unhealthy food magazine advertisement. Working paper.
- Scott, M. L., Nowlis, S. M., Mandel, N., & Morales, A. C. (2008). The effects of reduced food size and package size on the consumption behavior of restrained and unrestrained eaters. *Journal of Consumer Research*, 35(3), 391–405.
- Shames, L. (2009). U.S. Agriculture: Retail food prices grew faster than the prices farmers received for agricultural commodities, but economic research has not established that concentration has affected these trends. Washington, DC: Government Accountability Office.
- Sorensen, L.B., Moller, P., Flint, A., Martens, M., & and Raben, A. (2003). Effect of sensory perception of foods on appetite and food intake: A review of studies on humans. *International Journal of Obesity*, 27(10), 1152–1166.
- Steenhuis, I.H.M. & Vermeer, W.M. (2009). Portion Size: Review and framework for interventions. *International Journal of Behavioral Nutrition and Physical Activity*, 6(August), 58–67.
- Stewart, S.T., Cutler, D.M., & Allison, B.R. (2009). Forecasting the effects of obesity and smoking on US life expectancy. *New England Journal of Medicine*, 361(23), 2252-2260.

- Stroebele, N. & de Castro, J.M. (2004). Effect of ambience on food intake and food choice. *Nutrition*, 20(9), 821–838.
- _____. N. & de Castro, J.M. (2006). Listening to music while eating is related to increases in people's food intake and meal duration. *Appetite*, 47(3), 285–289.
- Stubbs, R.J. & Whybrow, S. (2004). Energy density, diet composition and palatability: Influences on overall food energy intake in humans. *Physiology & Behavior*, 81(5), 755–764.
- Swinburn, B., Sacks, G., & Ravussin, E. (2009). Increased food energy supply is more than sufficient to explain the US epidemic of obesity. *American Journal of Clinical Nutrition*, 90(6), 1453–1456.
- Thaler, R.H., & Sunstein, C.R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven: Yale University Press.
- Thomas, M., Desai, K.K. & Seenivasan, S. (2011). How credit card payments increase unhealthy food purchases: Visceral regulation of vices. *Journal of Consumer Research*, 38(1), 126–139.
- Thorndike, A.N., Sonnenberg, L., Riis, J., Barraclough, S., Levy, D.E. (2012). A 2-phase labeling and choice architecture intervention to improve healthy food and beverage choices. *American Journal Public Health*, 102(3), 527–533.
- Van Kleef, E., Otten, K. & van Trijp, H. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC Public Health*, 12(1), 1072.
- Vermeer, W.M., Alting, E., Steenhuis, I.H.M., & Seidell, J.C. (2010). Value for money or making the healthy choice: The impact of proportional pricing on consumers' portion size choices. *European Journal of Public Health*, 20(1), 65–69.
- Wansink, B. (1996). Can package size accelerate usage volume? *Journal of Marketing*, 60, 1–14.
- _____. & Chandon, P. (2006). Can 'low-fat' nutrition labels lead to obesity? *Journal of Marketing Research*, 43(4), 605–617.
- _____. & Kim, J. (2005). Bad popcorn in big buckets: Portion size can influence intake as much as taste. *Journal of Nutrition Education and Behavior*, 37(5), 242–245.
- Werthenbroch, K. (1998). Consumption self-control by rationing purchase quantities of virtue and vice. *Marketing Science*, 17(4), 317–337.
- World Health Organization (2000). *Obesity: preventing and managing the global epidemic*. (No. 894). Geneva: WHO.

(2014). World Health Statistics 2014, accessed December 31, 2015, available at http://www.who.int/gho/publications/world_health_statistics/2014/en/.

**CHAPTER II:
CAN FAT TAXES AND PACKAGE SIZE
RESTRICTIONS STIMULATE HEALTHY FOOD
CHOICES?**

CHAPTER II: CAN FAT TAXES AND PACKAGE SIZE RESTRICTIONS STIMULATE HEALTHY FOOD CHOICES?¹

Consumers prefer bonus packs, as opposed to price discounts, for healthy foods, but they want a price discount rather than a bonus pack for indulgent foods (Mishra & Mishra, 2011). This study conceptually replicates and extends this finding to show that consumers are more responsive to changes in price than to changes in package size for indulgent food options, whereas they are more responsive to changes in package size than to changes in price for healthy food options.

¹ Chapter II is published as “Huyghe, E. and Van Kerckhove, A. (2013). Can Fat Taxes and Package Size Restrictions Stimulate Healthy Food Choices? *International Journal of Research in Marketing*, 30 (4), 421-423.”

1. RESEARCH BACKGROUND

Obesity is ubiquitous and alarming worldwide (WHO, 2014). Public policy interventions such as restricting supersize packages and taxing unhealthy foods (e.g., ‘junk food taxes’ on soft drinks, candy, or snack foods and ‘fat taxes’ on high-fat foods), represent recent efforts to address the problem. Parallel with their introduction, recent marketing research has investigated whether package sizes and pricing of different food options might affect consumers’ food choices. For example, Chandon and Ordabayeva (2009) show that changes in packages and portions appear smaller when all three spatial dimensions have been changed (i.e., height, width and length) compared to a change in only one dimension. As a result, when portions change in three dimensions, consumers are more likely to downsize their portion as this three-dimensional change is not so obvious as a one-dimensional change. When it comes to pricing efforts, research of Sacks et al. (2011) shows that taxing unhealthy foods (e.g., a junk-food tax) is highly effective in reducing consumption. However, other research is mixed about the effectiveness of taxes as consumers might switch from expensive unhealthy foods to cheaper unhealthy foods (e.g., Clarck, Dittrich & Xu, 2014; Nederkoorn, Havermans, Giesen & Jansen, 2011).

To extend such research, this article addresses how changes in relative package size and price affect preferences for healthy or indulgent food. Specifically, we investigate how altering the relative value of healthy and indulgent food options (through price or package size changes) influences their relative preferences. Thus, this research is highly relevant for describing the effectiveness of policy efforts to deal with obesity.

We particularly extend research by Mishra and Mishra (2011), who study consumers’ preferences for price discounts or bonus packs for indulgent and healthy options (see Table 1 for an overview of the studies). Rather than investigating increases in the cost of food options (i.e., by increasing the price or decreasing the package size), they focus on financial benefits by studying consumers’ preference for price discounts and bonus packs for indulgent and healthy options. They build on research that shows that consumers generally prefer a bonus pack to a price discount, because bonus packs offer gains, whereas price discounts represent reduced losses (Diamond & Sanyal, 1990). Moreover, consumers hold more favorable perceptions towards bonus packs because the fact that they are getting an extra amount of the product for free becomes salient (Chandran & Morwitz, 2006). Mishra and Mishra (2011) show that consumers prefer a bonus pack to a price discount for healthy options but prefer a price discount to a bonus pack for indulgent options. For healthy options, consumers thus

follow the default option: a bonus pack. However, for unhealthy options they prefer a discount. Mishra and Mishra (2011) explain this latter finding by noting the difficulty of justifying the purchase of unhealthy food: Consumers cannot devise good reasons to purchase a bonus pack of unhealthy options, but a price discount mitigates their consumption guilt. For healthy options, consumers prefer the bonus pack, because they do not suffer from guilty feelings or a need to justify a larger purchase.

We extend their research and offer three extensions. First, in addition to price discounts and bonus packs, we consider price premiums and package reductions, which reflect recent public policy efforts. Second, our research setting confronts participants with a different choice problem. Whereas Mishra and Mishra (2011) asked participants to choose between price or bonus promotional offers for the same indulgent or healthy product, the participants in our study choose between healthy and indulgent food options, while the relative value of both options varies. Third, we take a range of value-increasing and -decreasing levels into consideration (−80% to +80%), instead of keeping the promotion level constant at +20% (Mishra & Mishra, 2011).

Even with these unique approaches, we replicate their findings: Decreasing the price is more effective for promoting unhealthy food, whereas a larger package size is more useful for promoting healthy food. These findings hold for interventions focused on decreasing the value of a product too. Specifically, increasing the price of an unhealthy food option is more likely to sway preferences in the direction of healthy food options than is decreasing the package size.

Table 1. Method and Results of the Original Studies and Replication Study

Study	Sample	Conditions	Products	Change in value	Dependent Variable	Results	
Mishra & Mishra (2011)	1	120 students	2 (product type: indulgent vs. healthy)	tasty chocolates vs. healthy chocolates	+ 20% on a reference offer of 35 chocolates for \$14	choice for price discount or bonus pack	Preference for a price discount is higher in the indulgent vs. healthy condition.
	2	323 students	2 (product type: indulgent vs. healthy) × 3 (offer: regular, price discount, bonus pack)	chocolates vs. raisins	+ 20% on reference offer of 24 oz. for \$6	purchase incidence (binary)	Odds of selecting an indulgent (healthy) option are 3.125 (5.31) times larger in case of a price discount (package premium).
	3	109 students	2 (offer: regular price vs. bonus pack) + consumption guilt as moderator	cake and fruit salad	+20% on reference of 20 oz. for \$7.99	willingness to buy each product	Willingness to buy cake on a price discount (with a bonus pack) increases (decreases) as chronic guilt increases. Willingness to buy the fruit salad is higher with a bonus pack than with a price discount, irrespective of guilt.
	4	160 students	2 (product type:	tasty chocolates	+ 20% on a	choice for	For the indulgent option, preference for a price

		indulgent vs. healthy) × 2 (justification: no-justification vs. control)	vs. healthy chocolates	reference offer of 35 chocolates for \$14	price discount or bonus pack	discount is diminished in the no-justification condition. For the healthy option, the majority chooses the bonus pack, irrespective of the justification condition.	
5	199 students	2 (offer: regular price vs. bonus pack) × 2 (altruism: donation vs. control)	chocolates vs. raisins	+ 20% on reference offer of 24 oz. for \$6	willingness to buy each product	Willingness to buy chocolates is higher with a price discount than with a bonus pack in the control condition, but not in the altruism condition. Willingness to buy raisins with a bonus pack is higher than with a price discount, irrespective of the altruism condition.	
Huyghe & Van Kerckhove	1	235 general population	2 (product type: indulgent vs. healthy) × 2 (offer: price discount vs. bonus pack)	chocolate cookie vs. granola bar, muffin vs. fruit salad, chocolates vs. raisins, chocolate bar vs. vegetable bowl	ranges from -80% to +80% on a reference offer of 200 grams for 2.5 euro	choice for indulgent or healthy option	Likelihood of choosing the indulgent option increases (decreases) when it becomes cheaper (more expensive), whereas changing its package size does not affect its choice likelihood. Likelihood of choosing the healthy option increases (decreases) when its package size increases (decreases), whereas changing its price does not affect its choice likelihood.

2. METHOD

The 235 participants (78 men; $M_{Age} = 32.40$, $SD = 13.80$) were recruited through the University's online research panel between the fifth and the twelfth of November, 2012 and completed an online questionnaire that consisted of four trials. The participants were presented with all four trials in a random order and each trial consisted of a combination of an indulgent and a healthy food option. The following combinations were presented to the participants in a random order: a chocolate cookie and a granola bar, a muffin and a fruit salad, chocolates and raisins, and lastly, a chocolate bar and a vegetable bowl). For each trial, participants indicated which product they would buy on an 11-point scale (1 = unhealthy food option, 11 = healthy food option). Each food option costs 2.5 euro for about 200 grams in a real retail environment, and this information appeared clearly on the first page of the questionnaire, such that participants had a clear idea of the reference value of all options. We manipulated relative values by changing the price or package size of either the indulgent or the healthy option. We used eight relative value levels; one option offered 20%, 40%, 60%, 80%, 120%, 140%, 160%, or 180% of the value of the other option (which equaled the reference value). For example, in a first trial, a participant had to choose between a healthy option of which the value was not altered (i.e., a value of 100%) and an unhealthy option of which the price was decreased with 20% (i.e., a value of 120%). In a second trial, the participant had to choose between a healthy option of which the package size was decreased with 40% (i.e., a value of 60%) and an unhealthy option of which the value was not altered, etcetera. In total, participants completed four trials, each of which represented a different condition. The experiment thus used a 2 (changed value product: indulgent vs. healthy) \times 2 (value-changing intervention: price vs. package size) \times 8 (level of change in relative value: 20%–180%) design, with 32 conditions.

3. RESULTS

Because each participant completed four conditions, we ran a multilevel regression model with the intention to select the option of which the value was altered as the dependent variable and the product type, type of intervention, extent to which the value changed, and all two- and three-way interactions as the independent variables. A similar analysis was run separately for men and women in our sample. As women are generally more concerned with physical appearance, weight and dieting than men (Crocker et al., 2003; Rozin, Bauer, & Catanese, 2003), while they at the same time rate snacks and chocolate more as comfort foods

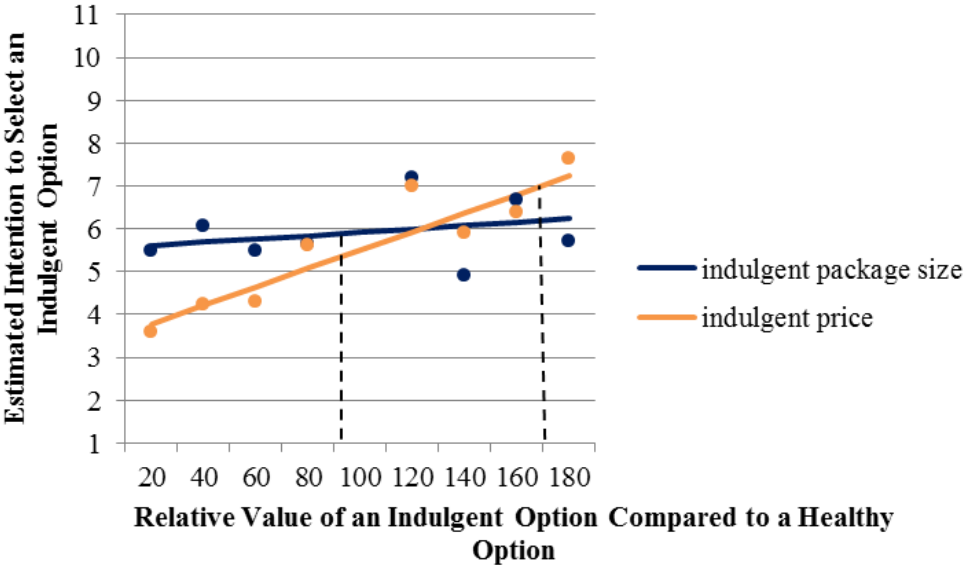
than men (Wansink, Cheney, & Chan, 2003), both sexes may respond differently to a trade-off between healthy and indulgent food options, and elements influencing this trade-off. When considering the entire sample, fitting a fixed effects model yielded a -2 Restricted Log Likelihood value of 4719.29. However, model fit improved significantly when allowing the slope of product type to vary for different participants. That is, the -2 Restricted Log Likelihood for this model is only 4702.73 ($\chi^2_{\text{Change}} = 16.56$, $df_{\text{Change}} = 1$, $p < .01$). This is the only multilevel model that fits the data better than a fixed effects model. Moreover, this is not only the statistically best fitting model, also theoretically it makes sense to set the slope of the variable product type random. We can assume that participants vary in their responsiveness to changes in the value of healthy and indulgent options; some may pay particular attention to this distinction while others may not consider indulgent and healthy options as truly distinct options. That is, while people in the US have been found to hold a ‘healthy = untasty’ intuition (Raghunathan, Naylor, & Hoyer, 2006), this intuition has been shown less pronounced in a European context (Werle, Trendel, & Ardito, 2012). The analysis yielded a significant three-way interaction effect ($b = -.03$, $t(904) = -3.91$, $p < .001$) which was not altered by including gender in the analysis ($b = -.03$, $t(895) = -3.01$, $p = .003$). The significant three-way interaction hence persists when separately considering men ($b = -.03$, $t(292) = -1.93$, $p = .055$) and women ($b = -.03$, $t(603) = -3.12$, $p = .002$) (see Table 2 for the parameter estimates). This finding suggest that men and women responded in a similar manner to changes in price and package size of healthy and indulgent food options (a more detailed analysis of other gender differences is provided in the appendix).

Table 2. Parameter Estimates for the Total Sample, and Men and Women Separately

	Total Sample				Men				Women			
	B	SE b	T	P	B	SE b	T	p	B	SE b	t	p
Intercept	5.537	.407	13.60	< .001	6.209	.74	8.37	< .001	5.215	.494	10.55	< .001
Product type	-.702	.602	-1.17	.244	-.818	1.157	-.71	.480	-.669	.714	-.94	.349
Type of Intervention	-2.189	.588	-3.72	< .001	-3.157	1.114	-2.84	.005	-1.709	.718	-2.38	.018
Value	.004	.004	1.04	.300	-.003	.007	-.42	.673	.007	.005	1.55	.122
Product type * Type of Intervention	3.057	.860	3.56	< .001	3.093	1.627	1.90	.058	2.979	1.050	2.84	.005
Product type * Value	.012	.005	2.23	.026	.015	.010	1.43	.154	.010	.006	1.59	.113
Type of Intervention * Value	.018	.005	3.33	.001	.028	.010	2.83	.005	.013	.006	1.99	.048
Product type * Type of Intervention * Value	-.030	.008	-3.91	< .001	-.028	.015	-1.93	.055	-.028	.009	-3.12	.002

Specifically, for indulgent options, changing the price exerted a greater effect than did adapting the package size. When indulgent food options became cheaper, they were more preferred over healthy options; when they were more expensive, participants preferred them less. However, limiting or expanding the package size had only a small effect on the choice likelihood for the indulgent option (see Figure 1). If the relative value of the indulgent option decreases by increasing its price, then the intention to choose this indulgent option over a healthy option (of a similar size with a relatively lower price) decreases substantially. However, when the relative value of the indulgent option decreases by decreasing its package size, then the intention to choose this indulgent option over a healthy option (of a relatively larger size with a similar price) does not decrease accordingly. The difference in effectiveness between a price and package size change was significant when the value of the indulgent option was less than 94.66% or greater than 176.00% of the reference value.

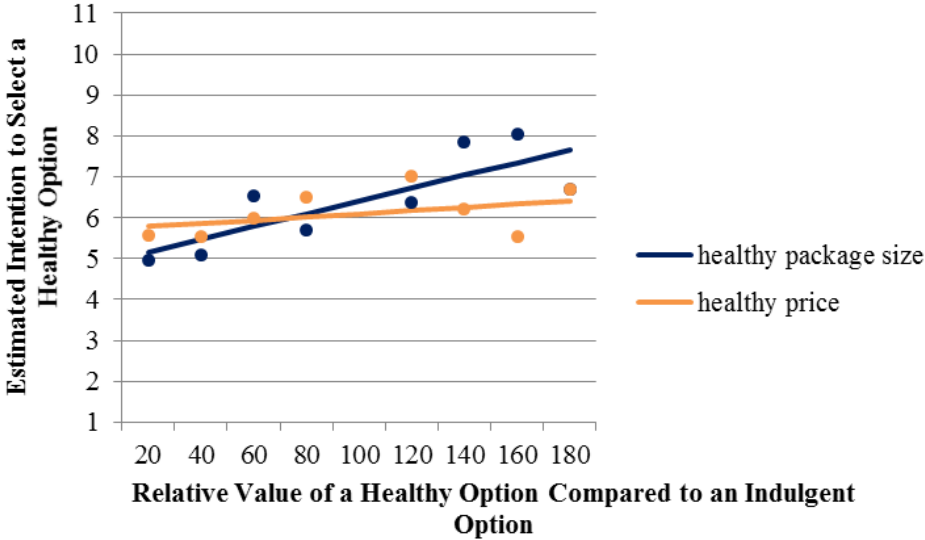
Figure 1. Estimated and Observed Intention to Select an Indulgent Option with Changes in Relative Values



Alternatively, for healthy food options, changing the package size, rather than the price, affected the likelihood of choice. When healthy food options increased in value because of their larger package size, but the price remained constant, consumers tended to select the healthy option. Altering the price of a healthy option did not affect its choice likelihood (Figure 2). The difference in the effectiveness of a change in package size compared with a

change in price was significant when the value of the healthy option was at least 160.91% of its original value.

Figure 2. Estimated and Observed Intention to Select a Healthy Option with Changes in Relative Values



Overall, for indulgent food options, adapting the price has a greater effect than adapting the package size, whereas for healthy food options, adapting the package size has a greater effect than adapting the price. These results replicate the findings of Mishra and Mishra (2011): Consumers prefer a price discount to a bonus pack for indulgent food options and a bonus pack to a price discount for healthy food options. In addition, we show that consumers are more responsive to a price premium than to a package reduction for indulgent food options, whereas they are more responsive to a package reduction than to a price premium for healthy food options.

Mishra and Mishra (2011) demonstrate preferences for different value-changing interventions for indulgent versus healthy food options with changes in value as small as 20%; our findings yield significant differences only for proportionally larger changes in value. However, the magnitude of the absolute reference price and package size is substantially smaller in our research. Therefore, proportionally larger changes in value are rather small in absolute terms, which may account for the absence of significant effects in the case of small changes in value.

4. REFERENCES

- Chandon, P., & Ordabayeva, N. (2009). Supersize in one dimension, downsize in three dimensions: Effects of spatial dimensionality on size perceptions and preferences. *Journal of Marketing Research*, 46(6), 739-753.
- Chandran, S., & Morwitz, V.G. (2006). The price of 'free'-dom: Consumer sensitivity to promotions with negative contextual influences. *Journal of Consumer Research*, 33(3), 384-392.
- Clark, J.S. & Dittrich, O.L. (2010). Alternative fat taxes to control obesity. *International Advances in Economic Research*, 16(4), 388-394.
- Crocker, J., Luthanen, R. K., Vooper, M. L., & Bouvrette, A. (2003). Contingencies of self-worth in college students: Theory and measurement. *Journal of Personality and Social Psychology*, 85(5), 894-908.
- Diamond, W. D., & Sanyal, A. (1990). The effect of framing on the choice of supermarket coupons. *Advances in Consumer Research*, 17(1), 488-493.
- Mishra, A., & Mishra, H. (2011). The influence of price discount versus bonus pack on the preference for virtue and vice foods. *Journal of Marketing Research*, 48(1), 196–206.
- Nederkoorn, C., Havermans, R.C., Giesen, J.C., & Jansen, A. (2011). High tax on high energy dense foods and its effects on the purchase of calories in a supermarket: an experiment. *Appetite*, 56(3), 760-765.
- Rozin, P., Bauer, R., & Catenese, D. (2003). Food and life, pleasure and worry, among American college students: Gender differences and regional similarities. *Journal of Personality and Social Psychology*, 85(1), 132-141.
- Sacks, G., Veerman, J.L., Moodie, M., & Swinburn (2011). Traffic-light nutrition labelling and 'junk-food' tax: a modelled comparison of cost-effectiveness for obesity prevention. *International Journal of Obesity*, 35(7), 1001-1009.
- Wansink, B., Cheney, M. M., & Chan, N. (2003). Exploring comfort food preferences across age and gender. *Physiology & Behavior*, 79(4), 739-747.
- WHO (2014). World Health Statistics 2014, accessed March 14, 2016, available at <http://www.who.int/features/factfiles/obesity/en/>

5. APPENDIX: CAN FAT TAXES AND PACKAGE SIZE RESTRICTIONS STIMULATE HEALTHY FOOD CHOICES?

As the experiment used a 2 (changed value product: indulgent vs. healthy) × 2 (value-changing intervention: price vs. package size) × 8 (level of change in relative value: 20%–180%) design, it comprises 32 conditions. Participants completed four trials, each of which represented a different, randomly selected condition. Tables A1 and A2 present the observed mean intentions to select the option of which the relative value was changed, along with the corresponding standard deviations and the number of trials on which the means were based.

Table A1. Observed Mean Intention to Select an Indulgent Option According to Changes in its Relative Value

		Relative Value of an Indulgent Option Compared to a Healthy Option							
		20	40	60	80	120	140	160	180
Package Size	<i>M</i>	5.48	6.07	5.50	5.65	7.18	4.91	6.69	5.71
	<i>(SD)</i>	(2.48)	(2.88)	(2.60)	(2.82)	(3.37)	(3.65)	(3.60)	(3.50)
	<i>N</i>	33	28	36	46	33	23	26	24
Price	<i>M</i>	3.60	4.25	4.29	5.63	7.00	5.90	6.39	7.63
	<i>(SD)</i>	(2.18)	(3.46)	(2.40)	(3.29)	(2.81)	(2.93)	(3.15)	(2.41)
	<i>N</i>	30	24	28	32	22	30	36	24

Table A2. Observed Mean Intention to Select a Healthy Option According to Changes in its Relative Value

		Relative Value of a Healthy Option Compared to an Indulgent Option							
		20	40	60	80	120	140	160	180
Package Size	<i>M</i>	4.96	5.10	6.55	5.70	6.38	7.85	8.04	6.70
	(<i>SD</i>)	(2.88)	(2.80)	(3.08)	(3.59)	(3.50)	(2.74)	(3.01)	(2.77)
	<i>N</i>	27	29	22	27	24	26	27	30
Price	<i>M</i>	5.56	5.53	6.00	6.50	7.00	6.21	5.55	6.71
	(<i>SD</i>)	(3.49)	(3.57)	(3.38)	(3.79)	(3.57)	(3.87)	(3.48)	(3.15)
	<i>N</i>	25	30	18	28	34	33	29	28

Because each participant completed four trials, we ran a multilevel regression model with the likelihood of selecting the option of which the value was changed as the dependent variable and the product type, type of intervention, extent to which the value changed, and all two- and three-way interactions as the independent variables. Fitting a fixed effects model yielded a -2 Restricted Log Likelihood value of 4719.29. Model fit, however, improved significantly when allowing the slope of product type to vary for different participants. That is, the -2 Restricted Log Likelihood for this model is only 4702.73 ($\chi^2_{\text{Change}} = 16.56$, $df_{\text{Change}} = 1$, $p < .01$). This is the only multilevel model that fits the data better than a fixed effects model.

Most importantly, the analysis yielded a significant three-way interaction effect ($b = -.03$, $t(904) = -3.91$, $p < .001$); an interaction that persists when separately considering men ($b = -.03$, $t(292) = -1.93$, $p = .055$) and women ($b = -.03$, $t(603) = -3.12$, $p = .002$) in our sample. Specifically, for indulgent options, changing the price exerted a greater effect than did adapting the package size. When indulgent food options became cheaper, they were more preferred over healthy options; when they were more expensive, participants preferred them less. However, limiting or expanding the package size had only a small effect on the choice likelihood for the indulgent option. The difference in effectiveness between a price and package size change was significant when the value of the indulgent option was less than 94.66% or greater than 176.00% of the reference value. Alternatively, for healthy food options, changing the package size, rather than the price, affected the likelihood of choice.

When healthy food options increased in value because of their larger package size, but the price remained constant, consumers tended to select the healthy option. Altering the price of a healthy option did not affect its choice likelihood. The difference in the effectiveness of a change in package size compared with a change in price was significant when the value of the healthy option was at least 160.91% of its original value. Overall, for indulgent food options, adapting the price has a greater effect than adapting the package size, whereas for healthy food options, adapting the package size has a greater effect than adapting the price.

Even though the focal finding of this research appears to hold for both men and women (i.e., the three-way interaction between product type, type of intervention, and value is not altered by including gender in the analysis), we found it imperative to explore other potential interactions of the manipulated variables with gender. When including gender in the analysis, the results point to an interesting significant interaction, a three-way interaction between type of intervention, value, and gender. Table A3 presents the parameter estimates for the estimated multilevel model including gender; clearly insignificant interactions were left out of the model.

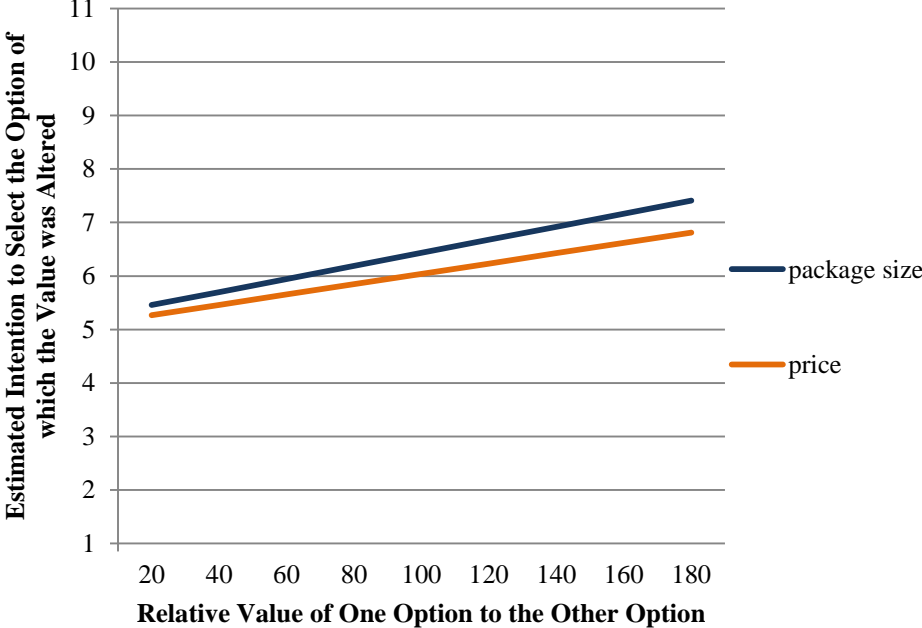
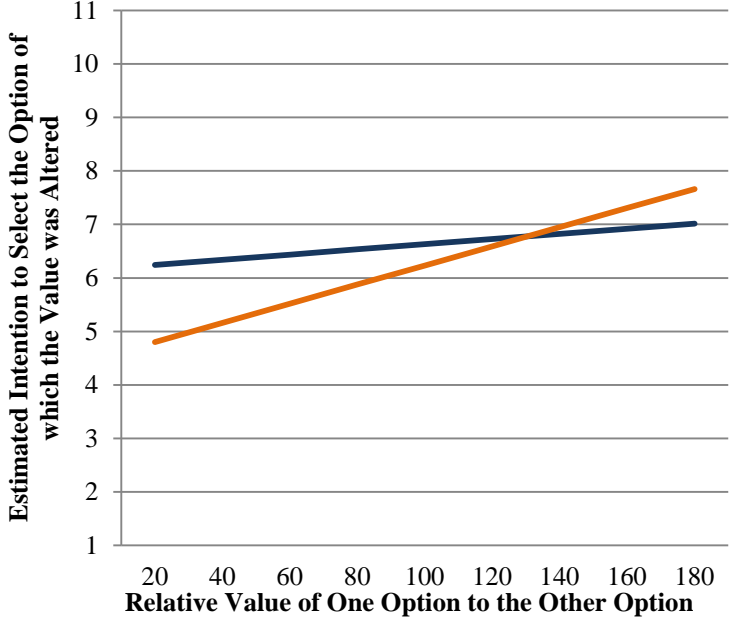
Table A3. Parameter Estimates for a Model Accounting for Gender Effects

	B	SE b	T	p
Intercept	5.208	.465	11.19	< .001
Product type	-.648	.604	-1.07	.283
Type of Intervention	-1.644	.667	-2.47	.014
Value	.007	.004	1.53	.126
Product type * Type of Intervention	3.057	.863	3.49	.001
Product type * Value	.012	.005	2.12	.034
Type of Intervention * Value	.012	.006	2.04	.042
Product type * Type of Intervention * Value	-.029	.008	-3.80	< .001
Gender	.936	.641	1.46	.15
Gender * Value	-.007	.006	-1.29	.198
Gender * Type of Intervention	-1.566	.909	-1.72	.085
Gender * Value * Type of Intervention	.016	.008	1.93	.054

The significant interaction between gender, value, and type of intervention suggests that, irrespective of whether the value of indulgent or healthy options was changed, men appear to be more responsive to changes in price rather than to changes in package size, while women are equally responsive to both (see Figure A1). This means that when the value of an option is lowered (increased) due to a price increase (discount) this is more likely to reduce (increase) the likelihood of choosing this option among men compared to when the value of this option was lowered (increased) due to a package size limitation (package premium).

Prior research suggested an overall preference for package premiums over price discounts (Diamond & Sanyal, 1990). Diamond and Sanyal (1990) reasoned that nonmonetary promotions (such as package premiums) make people feel as if they are gaining something extra while monetary promotions (such as price discounts) make consumers feel that they are “losing less than usual”. In line with Prospect Theory, they suggested that a promotion that is framed as a gain will feel more valuable than a promotion framed as a reduced loss. This overall preference, however, seems to be reversed for men in the current sample. Even though we did not anticipate on this interaction effect, some prior research already identified similar gender differences in the responsiveness to framing effects. For example, Fagley and Miller (1997) demonstrated that men’s responses were less in line with framing effects that were predicted based on Prospect Theory. Also Hasseldine and Hite (2003) find that men are more responsive to negatively framed messages than to positively framed messages; a finding which resembles the higher responsiveness of men to changes in price versus package size. Future research, however, should further address the robustness of this gender effect, especially given the rather small percentage of men (33.19 %) in our sample, and the potential underlying reasons for this difference in gender responses.

Figure A1. Estimated Intentions to Select the Option of which the Value was Altered with Changes in Relative Values for Men (Left Panel) and Women (Right Panel)



6. REFERENCES

- Diamond, W. D., & Sanyal, A. (1990). The effect of framing on the choice of supermarket coupons. *Advances in Consumer Research*, 17, 488–493.
- Fagley, N. S., & Miller, P. M. (1997). Framing effects and arenas of choice: Your money or your life?. *Organizational behavior and human decision processes*, 71(3), 355-373.
- Hasseldine, J., & Hite, P. A. (2003). Framing, gender and tax compliance. *Journal of Economic Psychology*, 24(4), 517-533.
- Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, 70, 170-184.
- Werle, C. O., Trendel, O., & Ardito, G. (2013). Unhealthy food is not tastier for everybody: The “healthy= tasty” french intuition. *Food Quality and Preference*, 28(1), 116-121.

CHAPTER III:
HOW THE MERE PRESENCE OF VARIETY FOOLS
THE MIND: EFFECTS OF INTRA-GROUP VARIETY
ON HEALTHINESS AND TASTINESS PERCEPTIONS

**CHAPTER III: HOW THE MERE PRESENCE OF VARIETY FOOLS THE MIND:
EFFECTS OF INTRA-GROUP VARIETY ON HEALTHINESS AND TASTINESS
PERCEPTIONS**

The ever expanding universe of product line extensions has led to omnipresent product variety in traditional supermarkets. How does great variety within a given product set (e.g., different coloured bell peppers, different types of peanuts) affect consumers' product perceptions, in terms of health and taste? The current study investigates how intra-group variety affects healthiness and tastiness perceptions for both healthy and unhealthy foods. Consumers perceive varied product sets as tastier. However, whereas varied (vs. non-varied) product sets are perceived as healthier when they contain healthy foods, they are perceived as less healthy for unhealthy foods.

1. INTRODUCTION

Variety is increasingly important in contemporary society. Consumers switch from one preferred alternative to another, even if they expect to enjoy the new alternative less, just for the sake of variety. In response, marketers offer an ever increasing product assortment, marked especially by proliferation in the number of line extensions. Marketers also increasingly offer mixed sets, providing variety within a single product line. Think, for example, of a package containing red, yellow and green bell peppers; groupings of differently flavoured yoghurts; sets of uniquely flavoured peanuts; or the variety in a box of chocolates.

Despite the prevalence of such varied sets, we know little about how consumers perceive them. In light of the worldwide obesity epidemic, it is important to determine whether variety affects the attractiveness of foods, including perceptions of their healthiness and tastiness. Does a varied set appear healthier and/or tastier than a non-varied set? How do such perceptions shift, depending on whether the foods have healthy or unhealthy connotations?

2. RESEARCH LANDSCAPE

As discussed in Chapter II of this doctoral dissertation, obesity is identified as an international health problem (WHO, 2014). The increase in obesity rates is mostly due to a more sedentary lifestyle (e.g., Pratt, Macera & Wang, 2000) and higher energy intakes as highly caloric food is largely available (e.g., Cutler, Glaeser & Shapiro, 2003; Swinburn, Sacks & Ravussin, 2009). This highly caloric food is often preferred over healthy food because consumers believe in the unhealthy = tasty intuition (Raghunathan, Naylor & Hoyer, 2006). According to this intuition, American consumers tend to overconsume unhealthy foods because they believe that unhealthy foods are tastier. This intuition is found for consumers who consider a negative correlation between healthiness and tastiness, but also for consumers who do not explicitly report this correlation. The unhealthy = tasty intuition thus acts on an implicit level. However, recent research shows that this unhealthy = tasty intuition does not hold true for all consumers: French consumers tend to believe in a healthy = tasty intuition: these consumers perceive healthy foods as tastier (Werle, Trendel & Ardito, 2013).

Apart from the fact that American consumers tend to follow the unhealthy = tasty intuition while French consumers tend to follow the healthy = tasty intuition, extant research shows that healthiness and tastiness perceptions have a strong impact on food intake. For

example, when it comes to healthiness perceptions, research shows that consumers underestimate the amount of calories of main dishes in restaurants that use healthy claims (e.g., Subway). As a result, they order more high-caloric side dishes (Chandon & Wansink, 2007). Moreover, research of Provencher, Polivy and Herman (2008) shows that participants ate more from oatmeal-raisin cookies when they were framed as rather healthy cookies compared to when they were framed as rather unhealthy cookies. Next to the effect of healthiness perceptions on food intake, research also illustrates that taste perceptions can have an impact on consumption. For example, Tepper and Trail (1998) demonstrate that the taste of a product is a key driver of the food choice. Moreover, taste is a predictor of both healthy (Brug, Lechner & De Vries, 1995) and unhealthy food consumption (Drewnowski, 1997): people consume more from tastier products.

Despite research showing the strong impact of healthiness and tastiness perceptions on intake, we know little about how within-set variety affects these perceptions. Previous research concentrates on variety in the overall diet, such as the extent to which consumers' diets encompass many different products or more of the same products. Such studies indicate that a low variety diet is associated with lower energy intake, because eating the same foods increases sensory-specific satiety, which decreases the foods' attractiveness (e.g., Johnson & Wardle, 2014, Vadiveloo et al., 2015). This sensory-specific satiety refers to the fact that consumers tend to have a decrease in pleasure when consuming the same food (e.g., Rolls, 1986).

In this paper, we focus instead on intra-group variety, which we define as variety within a specific product set. Unlike inter-group variety, intra-group variety does not indicate how varied a general diet is or how frequently a specific food is eaten. Still, we hypothesise that intra-group variety also delays satiation (Hetherington et al., 2006), such that for healthy and unhealthy foods alike, a varied set will seem tastier. We also acknowledge that intra-group variety might not increase taste perceptions, because sensory-specific satiety may not set in or might occur only later.

In terms of perceptions of healthiness, research suggests that people frequently classify foods according to a good/bad dichotomy as a simplifying strategy to make food choices (Rozin, Ashmore & Markwith, 1996). For example, Oakes and Slotterback offer compelling evidence that foods gain reputations as 'healthy' or 'unhealthy'. Assuming that people tend to classify foods this way, we propose that when evaluating intra-group variety in a product set, consumers tend to overestimate the healthy–unhealthy categorisation, because intra-group variety enhances the salience of the category by enabling them to perceive each item among

other, nearby items (Frick, 1987). Accordingly, consumers should perceive a varied set, compared with a non-varied set, as healthier for healthy foods, but less healthy for unhealthy foods, because the variety emphasises healthy attributes for healthy products (e.g. different kinds of vitamins), but it stresses unhealthy attributes for an unhealthy product (e.g. different kinds of fat and sugar). The marginal utility framework suggests similar results (Bernoulli, 1738): For varied product sets, each additional item should enhance healthiness and tastiness perceptions for healthy foods and unhealthiness and tastiness perceptions for unhealthy foods.

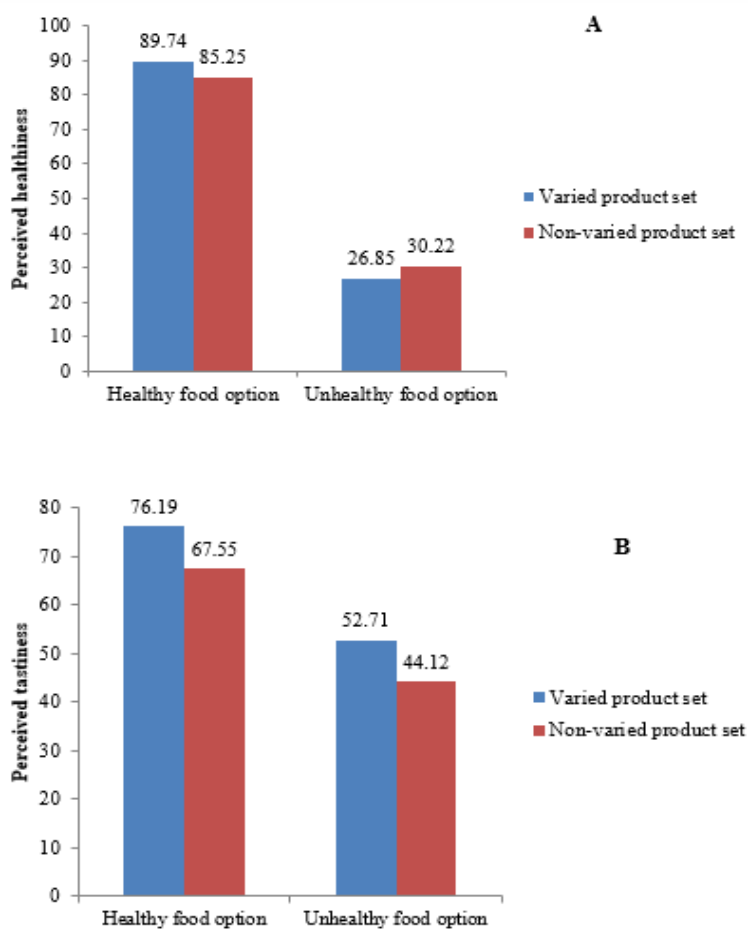
3. METHODS

One hundred twenty-seven undergraduates (98 women; $M_{\text{Age}} = 21.73$, $SD = 1.92$) were recruited through a university's online research panel and randomly assigned to the healthy (i.e., bell peppers) or unhealthy condition (i.e., crispy coated peanuts). In each condition, participants considered four product sets that differed in variety and rated each set on its perceived healthiness and tastiness, using 100-point scales (0 = very unhealthy, 100 = very healthy; 0 = very tasteless, 100 = very tasty). Participants in the healthy foods condition reviewed (1) three green, (2) three yellow, (3) three red bell peppers (i.e., non-varied product sets) and (4) a set with one green, one yellow and one red bell pepper (varied product set), in random order. For example, a participant had to rate the healthiness perception of three green bell peppers, followed by the tastiness perception of a varied product set etcetera until they rated the healthiness and tastiness perceptions of all product sets (i.e., three non-varied product sets and the varied product set). Participants in the unhealthy foods condition saw peanuts covered by (1) orange, (2) yellow and (3) brown fried dough (i.e., non-varied product sets) and (4) a mixed set of orange, yellow and brown coloured nuts, in random order. To test our hypothesis, we compare the perceived healthiness and tastiness of the varied product set with the average perceived healthiness and tastiness of the three non-varied product sets. For example, in the healthy condition, we thus compare the perceived healthiness (tastiness) of the product set containing one yellow, one green and one red bell pepper with the average perceived healthiness (tastiness) of the three non-varied product sets (i.e., three green, three yellow and three red bell pepper product sets). The same logic applies to the unhealthy condition.

4. RESULTS

A one-way mixed design analysis of variance with product type (healthy vs. unhealthy) as a between-subjects factor and variety (varied vs. non-varied product set) as a within-subjects factor reveals a significant interaction effect ($F(1, 125) = 18.04, p < .001$): On average, participants perceive the varied set as healthier than the non-varied sets for the healthy option ($M_{healthiness\ varied} = 89.74, SD = 10.81, M_{healthiness\ non-varied} = 85.25, SD = 13.22, F(1, 125) = 10.24, p = .002$) but unhealthier than the non-varied sets for the unhealthy option ($M_{healthiness\ varied} = 26.85, SD = 19.31, M_{healthiness\ non-varied} = 30.22, SD = 19.03, F(1, 125) = 7.80, p = .006$, Figure 1A). For both healthy and unhealthy foods, participants perceive the varied set as tastier ($F(1, 125) = 55.55, p < .001$; healthy: $M_{tastiness\ varied} = 76.19, SD = 23.94, M_{tastiness\ non-varied} = 67.55, SD = 22.19, F(1, 125) = 24.28, p < .001$; unhealthy: $M_{tastiness\ varied} = 52.71, SD = 24.20, M_{tastiness\ non-varied} = 44.12, SD = 21.48, F(1, 125) = 32.50, p < .001$; Figure 1B).

Figure 1. Influence of intra-group variety on perceived healthiness and tastiness of healthy and unhealthy foods



Moreover, it is worthwhile to investigate if participants tend to follow the unhealthy = tasty intuition or rather the healthy = tasty intuition. Bivariate correlations show a positive correlation between the healthiness and tastiness perceptions in each condition. When looking at how Belgian participants rated the mixed product set of bell peppers (i.e., healthy, varied product set) on healthiness and tastiness, we find a positive correlation ($r(52) = .42, p = .002$). The same effect holds for the other three conditions: healthiness and tastiness ratings correlate positively for the non-varied healthy condition ($r(52) = .35, p = .01$), the varied unhealthy condition ($r(71) = .25, p = .032$) and the non-varied unhealthy condition ($r(71) = .35, p = .003$). In other words, the higher the healthiness ratings, the higher the tastiness ratings or the higher the tastiness ratings, the higher the healthiness ratings. Furthermore, when comparing the overall tastiness ratings (i.e., both varied and non-varied product sets) between the healthy and the unhealthy condition, we find a significant effect: participants perceive the healthy product sets as tastier than the unhealthy product sets ($M_{tastiness\ healthy\ product\ set} = 71.87, SD = 22.31, M_{tastiness\ unhealthy\ product\ set} = 48.42, SD = 21.85; F(1, 125) = 35.13, p < .001$). Hence, it looks like Belgian participants lean more towards a healthy = tasty intuition.

5. DISCUSSION

To promote and support healthy eating, we need a better understanding of the factors that influence healthiness and tastiness perceptions. The results of this short report show that intra-group variety influences perceived healthiness and tastiness. Specifically, a varied set increases healthiness perceptions toward a healthy product but decreases them toward an unhealthy product. For both healthy and unhealthy products, consumers perceive a varied set as tastier than a non-varied set. Consumers' healthiness and tastiness perceptions of foods have important implications for public policy and marketers, because they influence energy intake (e.g., Provencher et al., 2009). Taste is still the main factor in the food decisions of (un)healthy eaters (e.g., Tepper & Trail, 1998). Despite growing interest in healthy lifestyles, many consumers still consume too many unhealthy foods. Offering more varied healthy food product sets and less varied unhealthy food product sets might be an effective tool for increasing healthy consumption while decreasing unhealthy eating. Moreover, it could be interesting to replicate this study across different cultures. Because in each condition the healthiness and tastiness ratings correlate positively and because the overall tastiness ratings are higher for the healthy foods compared to the unhealthy foods, it looks like the participants

tend to consider the healthy = tasty intuition. Also, other underlying processes than the one suggested in the theoretical framework, are possible. For example, in this study, the colors in the healthy condition (i.e., green, yellow and red) could be perceived as brighter and more dissimilar than the colors in the unhealthy condition (i.e., yellow, orange and brown). Also, while the different products in the unhealthy condition (i.e., orange, yellow and brown colored nuts) taste about the same, there are probably more taste differences between the different products in the healthy condition. In general, a green bell pepper is less sweet than a red or yellow bell pepper. Therefore, we cannot exclude that the more dissimilarity in colors and taste in the healthy condition could have caused the effect. Replicating the effect with more different products in different countries could provide more insight into the interaction effect and the underlying processes.

6. REFERENCES

- Bernoulli, D. (1738). Specimen theoriae novae de mensura sortis. *Commentarii Academiae Scientiarum Imperialis Petropolitanae*, 175-192. English translation in *Econometrica* (1954), Exposition of a new theory on the measurement of risk, 22(1), 22-36.
- Brug, J., Lechner, L., & De Vries, H. (1995). Psychosocial determinants of fruit and vegetable consumption. *Appetite*, 25(3), 285-296.
- Chandon, P. & Wansink, B. (2007). The biasing health halos of fast-food restaurant health claims: lower calorie estimates and higher side-dish consumption intentions. *Journal of Consumer Research*, 34(3), 301-314.
- Cutler, D.M., Glaeser, E.L., & Shapiro, J.M. (2003). Why have Americans become more obese? Cambridge, MA: Harvard Institute of Economic Research.
- Drewnowski, A. (1997). Taste preferences and food intake. *Annual Review of Nutrition*, 17(1), 237-253.
- Frick, R.W. (1987). The homogeneity effect in counting. *Perception and Psychophysics*, 41(1), 8-16.
- Hetherington, M.M., Foster, R., Newman, T., Anderson, A.S., & Norton, G. (2006). Understanding variety: tasting different foods delay satiation. *Physiology & Behavior*, 87(2), 263-271.
- Johnson, F. & Wardle, J. (2014). Variety, palatability, and obesity. *Advances in Nutrition: An International Review Journal*, 5(6), 851-859.
- Oakes, M.E. & Slotterback, C.S. (2001). What's in a name? A comparison of men's and women's judgments about food names and their nutrient contents. *Appetite*, 36(1), 29-50.
- Pratt, M.J., Macera, C.A., & Wang, G. (2000). Higher direct medical costs associated with physical inactivity. *The Physician and Sportsmedicine*, 28(10), 63-70.
- Provencher V., Polivy, J. & Herman, C.P. (2009). Perceived healthiness of food. If it's healthy, you can eat more! *Appetite*, 52(2), 340-344.
- Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, 70, 170-184.
- Rolls, B. J. (1986). Sensory-specific satiety. *Nutrition Review*, 44(3), 93-101.

- Rozin P., Ashmore, M. & Markwith, M. (1996). Lay American conceptions of nutrition: dose insensitivity, categorical thinking, contagion, and the monotonic mind. *Health Psychology*, 15(6), 438-447.
- Swinburn, B., Sacks, G., & Ravussin, E. (2009). Increased food energy supply is more than sufficient to explain the US epidemic of obesity. *American Journal of Clinical Nutrition*, 90(6), 1453-1456.
- Tepper, B.J. & Trail, A.C. (1998). Taste or health: A study on consumer acceptance of corn chips. *Food Quality and Preference*, 9(4), 267-272.
- Vadiveloo, M., Dixon, L.B., Mijanovich, T., Elbel, B. & Parekh, N. (2015). Dietary variety is inversely associated with body adiposity among US adults using a novel food diversity index. *Journal of Nutrition*, 145(3), 555-563.
- Werle, C. O., Trendel, O., & Ardito, G. (2013). Unhealthy food is not tastier for everybody: The “healthy= tasty” french intuition. *Food Quality and Preference*, 28(1), 116-121
- World Health Organization (2014). World Health Statistics 2014, accessed March 21, 2016, available at http://www.who.int/gho/publications/world_health_statistics/2014/en/.

CHAPTER IV:
TO SQUEEZE OR NOT TO SQUEEZE: HOW
SQUEEZE TUBES AFFECT CONSUMERS' SERVING
SIZES

CHAPTER IV: TO SQUEEZE OR NOT TO SQUEEZE: HOW SQUEEZE TUBES AFFECT CONSUMERS' SERVING SIZES

Squeeze tubes increasingly complement traditional packaging. But, would squeeze tubes - besides offering ease of use - also affect consumers' serving sizes? And if so, in what way? To answer these questions, we contrast the motor fluency hypothesis (i.e., bodily movements affect judgments) with the consumption monitoring hypothesis (i.e., paying attention to quantities eaten affects consumption). Two studies reveal that consumers use less of a product when it comes in a squeeze tube versus a traditional container, providing initial evidence for the consumption monitoring hypothesis. A third study also provides evidence that the ease of consumption monitoring drives the squeeze tube effect, which is more prominent for unrestrained eaters. These findings have important implications for consumers, public policy makers, and product manufacturers.

1. INTRODUCTION

Food products come in various packages that provide different levels of convenience. For example, many condiments, such as mayonnaise, are not only offered in jars, but squeeze tubes were launched to increase the ease of handling the package. In this case, does the type of packaging (new, easy-to-handle vs. traditional, less easy-to-handle) affect serving sizes? That is, do consumers use more or less of a product when it comes in a squeeze tube?

The alarming obesity rates worldwide (e.g., more than 50% of U.S. adults are overweight or obese; WHO (2014)), demonstrate the relevance of these questions. As packaging is often the first product attribute to which consumers are exposed, its effect on consumer responses has already received extensive research attention. Prior research has examined the impact of different packaging features on consumer behavior, including imagery (Harris, Schwartz & Brownell, 2009), size (Chandon & Wansink, 2002; Wansink, 1996), and promotion types (e.g., Mishra & Mishra, 2011). For example, packages with licensed characters increase the appeal of food (Harris, Schwartz & Brownell, 2009), larger package sizes increase consumption (Chandon & Wansink, 2002; Wansink, 1996), and consumers prefer bonus packs for virtue foods and price discounts for vice foods (Mishra & Mishra, 2011). These previous studies thus reveal different consumer responses related to the visual attributes of packaging. However, to the best of our knowledge, no research to date has investigated the effect of package handling on serving sizes, even though user friendliness is a key product differentiator. In particular, in the past decade, introductions of easy-to-use products have been widespread.

Therefore, the present study investigates the effect of user-friendly (i.e., easy-to-use) packaging on the serving sizes that consumers select for themselves. We focus on squeeze tubes versus traditional containers (e.g., jars, packs), because squeeze tubes are widely used and subject to increasing demand (Bharat Book Bureau, 2015), and because theoretically, this packaging should affect consumers' serving sizes, according to two distinct hypotheses. First, motor fluency can affect judgments (Alter & Oppenheimer, 2009; Beilock & Holt, 2007; Elder & Krishna, 2012; Ping, Dhillon & Beilock, 2009). Easy-to-handle packaging such as squeeze tubes likely create a motor fluency effect, which could lead consumers to consume more of a product. Second, consumption monitoring is a key determinant of how much a person eats (Giner-Sorolla, 2001; Polivy, Herman, Hackett & Kuleshnyk, 1986; Scott, Nowlis, Mandel, & Morales; 2008; Wertenbroch, 1998). Because consumers can see the volume of the product increasing as they use a squeeze tube, perhaps they find it easier to

monitor their behavior and define the portion they want to consume. For example, when using a mayonnaise squeeze tube, consumers can see the volume of mayonnaise steadily increasing on their plate, whereas when they scoop mayonnaise from a jar, the resulting volume does not grow steadily but instead appears on the plate all at once. The ability to monitor serving sizes more easily might reduce the portions consumers serve themselves. But will the predicted squeeze tube effect always occur? Probably not. We also investigate individual differences in restrained eating as a boundary condition.

In addition to contributing to motor fluency, consumption monitoring, and restrained eating literature, our investigation of easy-to-handle packaging and its effects on serving sizes has societal and practical significance. The persistence of the obesity epidemic indicates that many consumers struggle to limit their food intake. Clarifying how squeeze tubes may affect this epidemic offers substantive relevance for both food manufacturers and consumers.

In the next section, we present the theoretical background for our research, following which we develop our hypotheses. We then present the results of three experiments and conclude by discussing the theoretical contributions and practical implications of our findings.

2. THEORETICAL BACKGROUND

2.1 Motor fluency

As consumer behavior literature reveals, cognitive fluency increases liking, preference, confidence judgments, and behavioral choice (Alter, Oppenheimer, Epley, & Eyre, 2007; Fang, Singh, & Ahluwalia, 2007; Weijters, Geuens, & Baumgartner, 2013; Winkielman, Schwarz, Fazendeiro, & Reber, 2003). Besides cognitive fluency, previous research illustrates that also motor fluency – defined as the fluency that arises from the use of the motor system – can affect judgments (Alter & Oppenheimer, 2009; Beilock & Holt, 2007; Elder & Krishna, 2012; Ping et al., 2009). For example, holding a pencil in one's mouth, in a way that either facilitates or inhibits smiling, influences affective responses (Strack, Martin, & Stepper, 1988). This motor fluency (Ping et al., 2009) or embodied cognitive fluency (Alter & Oppenheimer, 2009) prompts theory that indicates fluent processing of stimuli leads to more positive evaluations. Specifically, motor fluency means that easily performed actions give rise to positive feelings that spill over to the object of attention, because a feeling of ease results from bodily feedback, namely, motor behavior.

This motor fluency effect explains why products that are easy to interact with tend to be liked better by consumers. Because they eliminate the need for cutlery, squeeze tubes are very easy to interact with, such that consumers simply squeeze the package to obtain the desired product. Therefore, we predict that consumers might use more of a product that comes in an easy-to-handle package, such as a squeeze tube, rather than in less easy-to-handle packaging, because the experience of the motor fluency effect facilitates their consumption. On the basis of this reasoning, we hypothesize:

H₁: Consumers' serving sizes are larger when the product comes in a squeeze tube versus a traditional container.

2.2 Ease of consumption monitoring

Consumption monitoring is a key determinant of how much a person eats. In many contexts, monitoring and paying attention to quantities consumed is important for successful, or failed, self-control (Baumeister 2002; Carver & Scheier 1998). In Polivy et al.'s (1986) study, participants ate fewer candies when they were aware of how much they were eating. In research into the effects of transparent versus opaque packaging on food consumption, the transparent package reduced consumption, due to a monitoring effect. Because consumers could monitor the remaining food in a transparent package more easily, they stopped eating sooner than they did when the package was opaque (Deng & Srinivasan, 2013). Not only the material of the packaging may influence the ease of consumption monitoring, but also the size of the packaging. Coelho do Vale, Pieters, and Zeelenberg (2008) show that consumers deliberated more before consuming, and thus consumed less, when tempting products came in large packages, but small packages remained unnoticed. Consumers often apply rules to define acceptable consumption and how much they will actually consume (Kahn & Wansink, 2004), and package size is a central criterion. That is, people tend to believe that smaller packages constitute normal quantities that can be consumed in full, without monitoring, whereas larger packages contain more than a single serving. Therefore, larger packages increase monitoring.

We believe that the ease of handling the product, due to its packaging, similarly may affect consumption monitoring. As the volume of the product served, for subsequent consumption, increases steadily with squeeze tubes, consumers might find it easier to monitor their behavior and define the portion they want to consume. If they enable consumers to

monitor their consumption more easily and accurately, squeeze tubes may reduce consumers' serving sizes. That is, we formulate a second, rival hypothesis:

H₂: Consumers' serving sizes are smaller when the product comes in a squeeze tube versus a traditional container.

2.3 Restrained eating

The food environment in modern, developed nations offers a large variety of cheap, tasty, easily available sweet and fatty foods, as well as healthy foods. Some consumers thus purposefully restrain their eating, and individual differences in restrained eating likely affect the predicted squeeze tube effect. According to previous research, consumption depends on how concerned consumers are about their weight (e.g., Cavanagh, Kruja, & Forestell, 2014). For example, adding brand and caloric information to packaging leads restrained eaters to eat more of an unhealthy, branded cookie if it features a low-calorie label but more of a healthy, branded cookie when no label appears on the packaging. In contrast, unrestrained eaters eat more of the healthy, branded cookie, regardless of the caloric information provided (Cavanagh et al., 2014). The size of the packaging also affects consumption by (un)restrained eaters, such that restrained eaters consume more calories from small food in small packages, but unrestrained eaters consume more calories from large food in large packages (Scott et al., 2008).

Restrained eaters thus can be misled by cues of brand information, calorie labels, and package sizes (Cavanagh et al., 2014; Scott et al., 2008), yet in general, they restrict their food intake to avoid gaining weight. Because they pay a lot of attention to what and how much they consume, we do not expect substantial differences in their consumption due to an easy-to-handle, versus a less easy-to-handle, package, as long as the packaging does not provide misleading cues. Among unrestrained eaters, who are less concerned with their weight, we predict that the packaging effect will be more prominent.

H₃: The squeeze tube effect will be more prominent for unrestrained than for restrained eaters.

With these predictions, we attempt to contribute to extant literature in several ways. First, we extend packaging literature by introducing user-friendliness, in terms of being easy

to handle, as an important attribute that affects the serving sizes that consumers select for themselves. Second, we contribute to consumption monitoring and motor fluency literature by introducing them as underlying mechanisms of the effect of packaging on serving sizes. Third, by introducing restrained eating as a boundary condition, we add to restrained eating literature and reveal that the type of packaging has a greater impact on serving sizes when consumers are unrestrained eaters. Specifically, in Study 1 we investigate the existence and nature of the squeeze tube effect to answer our central research question: Does easy-to-handle packaging influence consumers' serving sizes, and if so, do the servings increase or decrease? Study 2 replicates the effect, while controlling for consumers' perceptions of the substance, shape, and healthiness' perceptions of the products. Study 3 investigates the underlying mechanism and shows that restricted eating is a boundary condition for the squeeze tube effect.

3. STUDY 1

With Study 1, we investigate whether squeeze tubes facilitate or reduce consumers' chosen serving sizes and thus whether motor fluency theory or ease of consumption monitoring theory holds. We selected baking butter as the focal product, which is available in both an easy-to-handle squeeze tube and a less easy-to-handle butter pack in reality, with widespread adoption of both formats in the country in which we conducted this study.

3.1 Method

3.1.1 *Participants*

In total, 82 respondents from a large western European university participated in Study 1. Three respondents were excluded because they did not use any butter to fry their egg, as required by the experiment, or because they made the precise measurement of their butter usage impossible. Thus, 79 students (41 women; $M_{\text{age}} = 20.64$ years, $SD_{\text{age}} = .88$) entered the analyses. To test participants' varying consumption, depending on product packaging, we created a between-subjects design with two conditions (squeeze tube vs. traditional container), to which they were randomly assigned.

3.1.2 Procedure

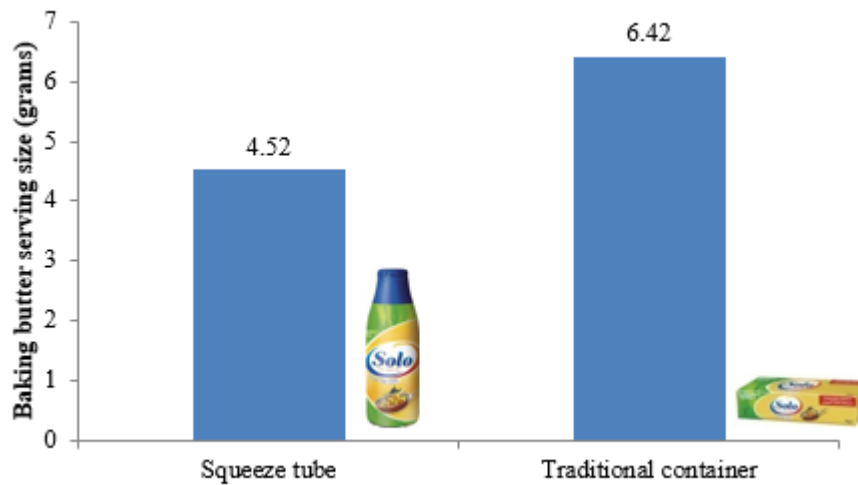
Participants were invited to the university consumer lab and received the same assignment: “We would like to ask you to fry an egg as we are interested in the actions consumers undertake to break an egg. In the room next door, you will find the equipment you need to fry an egg (electrical fire, egg, butter, pan,...). You can fry the egg any way you like (sunny side up, scrambled egg, omelet,...).” By giving each participant these instructions, we concealed the purpose of the experiment; that is, participants focused on breaking the egg rather than on the volume of baking butter they used.

Each participant entered the room separately and received all the noted equipment, including butter. We carefully measured upfront the weight of the butter before providing it and gave each participant a full, unused butter package (squeeze tube or butter pack), which ruled out the possibility that a respondent might determine the portion on the basis of what a previous person took (i.e., anchoring effect; Tversky & Kahneman, 1974). Participants in the easy-to-handle condition received baking butter in a squeeze tube; those in the less easy-to-handle condition used a baking butter pack. The brand, weight, and colors on the packaging were the same for both conditions; only the way participants handled the packages differed. After reading the assignment, each participant fried an egg and provided socio-demographic information, such as their age and gender. We weighed how much butter they had used after they completed the experiment.

3.2 Results and discussion

A one-way analysis of variance (ANOVA) shows that participants using the squeeze tube used less of the baking butter than participants using the traditional container ($M_{\text{squeeze tube}} = 4.52$ g, $SD_{\text{squeeze tube}} = 2.75$; $M_{\text{pack}} = 6.42$ g, $SD_{\text{pack}} = 3.38$; $F(1, 77) = 7.47$, $p = .008$), in preliminary support of H_2 rather than H_1 (Figure 1). Including gender as a covariate did not affect our results.

Figure 1. Main effect of squeeze tube vs. traditional container on baking butter serving size (Study 1)



Thus, by investigating the effect of an easy-to-handle squeeze tube versus a traditional, less easy-to-handle container on respondents' serving sizes, we found support for H₂, which aligned with the ease of consumption monitoring theory. However, this preliminary evidence for H₂ suffers three shortcomings. First, the squeeze tube contained fluid butter, whereas the traditional container contained solid butter. The difficulty of estimating a solid substance compared with a fluid substance might have biased the findings. Second, respondents' perceptions of the healthiness of solid versus fluid butter may differ, which also could have induced a bias. Third, both products contained the same amount of baking butter, but the squeeze tube had a vertical shape, whereas the butter pack was horizontal, which might have led to a bias. Previous research has shown that people only use vertical dimensions to estimate portions (Piaget, 1969; Raghurir & Krishna, 1999). Therefore, consumers might have perceived that the squeeze tube contained more of the product, compared with the butter pack, which could have affected their consumption. To overcome these shortcomings, the experimental condition in Study 2 maintains both the type of substance and the vertical–horizontal positioning constant and measures respondents' healthiness perceptions.

4. STUDY 2

In Study 2, we use mayonnaise; its product substance is the same in the easy-to-handle and less easy-to-handle conditions, and both packages (squeeze tube and jar) have vertical shapes. Both formats also are available in reality and widely adopted in the study setting. Participants in the easy-to-handle condition used mayonnaise in a squeeze tube; participants in the less easy-to-handle condition used mayonnaise in a jar. Because we could not perfectly match the weight of both packages, we chose to use a 300 ml (instead of 550 ml) jar and a small spoon compared with a 450 ml squeeze tube. Previous research has shown that bigger packages and bigger spoons accelerate usage volume (Wansink, 1996, 2004), and we wanted to ensure that the effect could not be attributed to this bias. Therefore, as a more conservative test, we used the smaller 300 ml jar with a small spoon instead of the bigger jar.

4.1 Method

4.1.1 Participants

In total, 83 students from a large western European university participated in Study 2. Of these, 12 were excluded due to incomplete data (8 did not use any mayonnaise, and 4 did not complete some of the questions). Thus, the analyses were based on 71 respondents (39 women; $M_{\text{age}} = 21.86$ years, $SD_{\text{age}} = 3.73$). To test whether participants' consumption differed depending on the product packaging they used, we created a between-subjects design with two conditions (squeeze tube vs. jar), to which they were randomly assigned.

4.1.2 Procedure

University students who were subscribed to participate in lab experiments received the following information upfront: "We are looking for students who want to participate in a taste test of soft drinks. To arouse thirst, French fries will be provided." By providing this information, we concealed the purpose of our experiment, such that participants likely focused on the taste of soft drinks. We also chose to provide French fries, because mayonnaise is often consumed with French fries in the country under investigation.

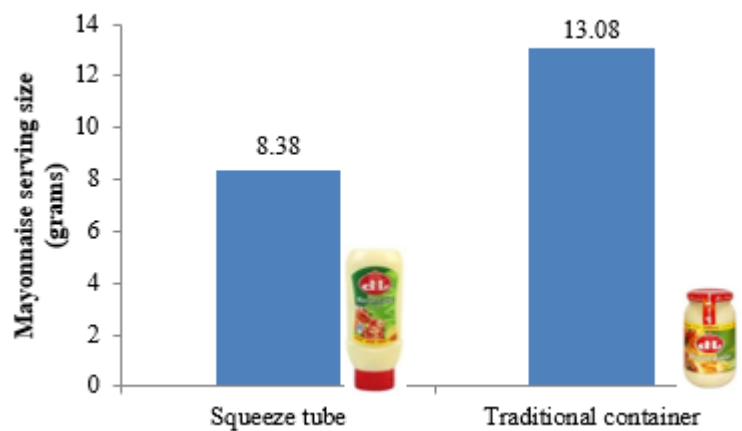
Participants were invited to the university consumer lab. Before they completed the soft drink taste test, each participant entered the lab separately and was told that he or she could

put some mayonnaise on a plate and that the French fries would be coming soon. As in Study 1, we gave each participant a new package, to rule out any anchoring effects (Tversky & Kahneman, 1974). Participants in the easy-to-handle condition received mayonnaise in a squeeze tube, and those in the less easy-to-handle condition used mayonnaise in a jar. The weight of both packages was carefully measured upfront. The brand, vertical orientation of the product, and colors on the packaging were the same for both conditions. Once they served themselves mayonnaise, participants entered another room and received their French fries, then started the soft drink taste test. After they finished this taste test, they completed a survey that asked about how user friendly the packaging was (“The packaging increases the user friendliness” and “I can easily use the mayonnaise due to the packaging”; 1 = “totally disagree,” to 7 = “totally agree”), how healthy they thought mayonnaise was (1 = “not healthy at all,” to 7 = “very healthy”), their experience with the packaging (“I have experience with the packaging of the product”; 1 = “totally disagree,” to 7 = “totally agree”), their gender, and their age. Each time a respondent left the room, the experiment leader carefully weighed the remaining squeeze tube or jar.

4.2 Results and discussion

First, we confirmed that participants perceived the squeeze tube as more user friendly than the jar. The two statements measuring user friendliness correlated at .90. A one-way ANOVA showed that participants perceived the squeeze tube as more user friendly ($M_{\text{squeeze tube}} = 5.68$, $SD_{\text{squeeze tube}} = .19$; $M_{\text{jar}} = 3.32$, $SD_{\text{jar}} = .18$; $F(1,69) = 78.15$, $p < .001$). However, participants’ healthiness perceptions of the mayonnaise did not differ between the two conditions ($F(1,69) = .40$, $p = \text{ns}$): They considered the mayonnaise in the jar ($M = 2.16$, $SD = .15$) equally unhealthy as mayonnaise in the squeeze tube ($M = 2.03$, $SD = .15$). Second, a one-way ANOVA showed that participants in the easy-to-handle condition used less mayonnaise than those in the less easy-to-handle condition ($M_{\text{squeeze tube}} = 8.38$ g, $SD_{\text{squeeze tube}} = 3.97$; $M_{\text{jar}} = 13.08$ g, $SD_{\text{jar}} = 5.13$; $F(1,69) = 18.35$, $p < .001$), in additional support of H₂ and ease of consumption monitoring theory (Figure 2). Adding gender and experience with the type of packaging as covariates did not influence these results either.

Figure 2. Main effect of squeeze tube vs. traditional container on mayonnaise serving size, holding substance and vertical positioning constant (Study 2)



With Study 2, we thus sought to explore the effect of easy-to-handle packaging on consumers' serving sizes while holding the substance constant and taking healthiness perceptions into account. We replicated the results of Study 1, such that participants used more when they dealt with packaging that was less easy to handle, so the ease of consumption monitoring appears to be driving the outcomes, rather than motor fluency.

5. STUDY 3

In Study 3, we seek to provide experimental evidence that the ease of consumption monitoring mediates the relationship between packaging and consumers' serving sizes, while ruling out a motor fluency explanation. In addition, we test whether the effect of packaging on consumers' serving sizes, through the ease of consumption monitoring, is stronger for unrestrained than for restrained eaters (H_3).

5.1 Method

5.1.1 Participants

In total, 128 students from a large western European university participated in Study 3. Twenty participants were excluded because they never eat mayonnaise, leaving 108 participants (63 women; $M_{\text{age}} = 21.50$ years, $SD_{\text{age}} = 2.15$) for the analyses. To test the underlying process driving the packaging effects, we created a between-subjects design with

three conditions, to which participants were randomly assigned: (1) easy-to-handle condition (mayonnaise in a regular squeeze tube, 450 ml), (2) less easy-to-handle condition (mayonnaise in a 300 ml jar and a small spoon), and (3) a third condition in which we adapted the easy to handle packaging and made the opening bigger. Thus, the motor fluency experience is constant across conditions 1 and 3, but the ease of consumption monitoring is impeded in the latter.

5.1.2 Procedure

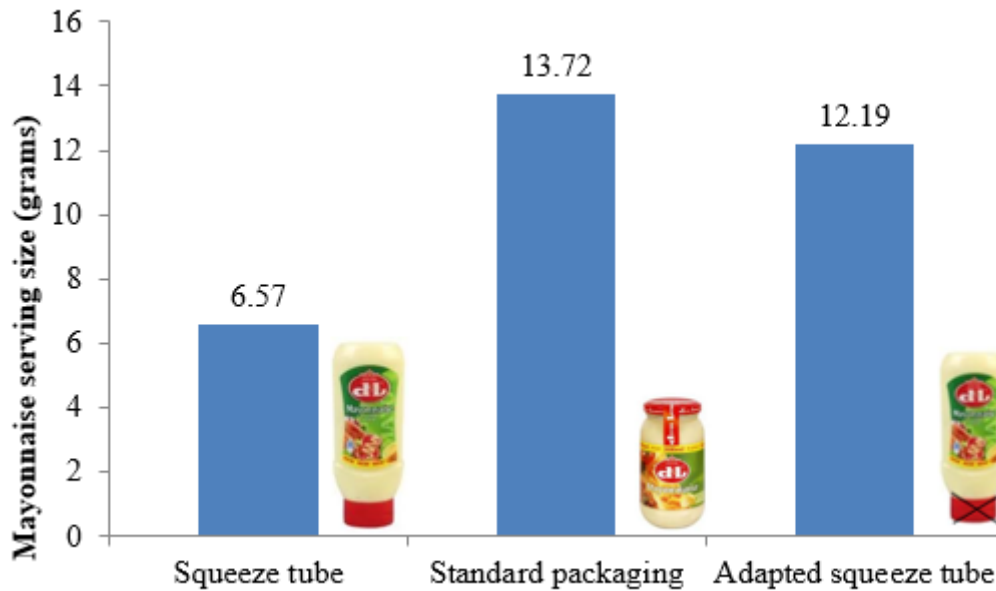
Similar to Study 2, participants were told that they would take part in a soft drink taste test and that French fries would be provided. After they put mayonnaise on their plate, received French fries, and participated in the taste test, they completed a survey that measured ease of consumption monitoring (three items: “I have the feeling that I unconsciously used too much mayonnaise,” “I was able to monitor how much mayonnaise I took,” and “It was easy to keep track of how much mayonnaise I put on the carton plate”; seven-point scales: 1 = “totally disagree,” to 7 = “totally agree”, Cronbach’s $\alpha = .65$), restrained eating (Dutch Eating Behavior Questionnaire with five-point scale; van Strien, Frijters, Bergers, & Defares, 1986; e.g., “Do you watch exactly what you eat?”; 1 = “never,” to 5 = “very often”, Cronbach’s $\alpha = .93$), their perceptions of the healthiness of mayonnaise (1 = “not healthy at all,” to 7 = “very healthy”), their gender, and their age.

5.2 Results and discussion

A one-way ANOVA shows that the consumers’ serving sizes differed across package formats ($F(2,105) = 16.61, p < .001$). Planned contrasts show that participants using the regular squeeze tube ($M_{\text{regular squeeze tube}} = 6.57$ g, $SD_{\text{regular squeeze tube}} = 3.10$) used less mayonnaise than participants using either the jar ($M_{\text{jar}} = 13.72$ g, $SD_{\text{jar}} = 5.73$; $t(59.16) = -6.56, p < .001$) or the adapted squeeze tube ($M_{\text{adapted squeeze tube}} = 12.19$ g, $SD_{\text{adapted squeeze tube}} = 6.04$; $t(61.08) = -5.06, p < .001$; Figure 3). Consumption by participants using the squeeze tube differed significantly from that of participants using the adapted squeeze tube ($M_{\text{squeeze tube}} = 6.57$ g, $M_{\text{adapted squeeze tube}} = 12.19$ g; $t(61.08) = 5.06, p < .001$). This finding excludes motor fluency as an explanatory variable as motor fluency was held constant in both conditions. Furthermore, including gender as a covariate in the analysis did not affect the results. Also, healthiness

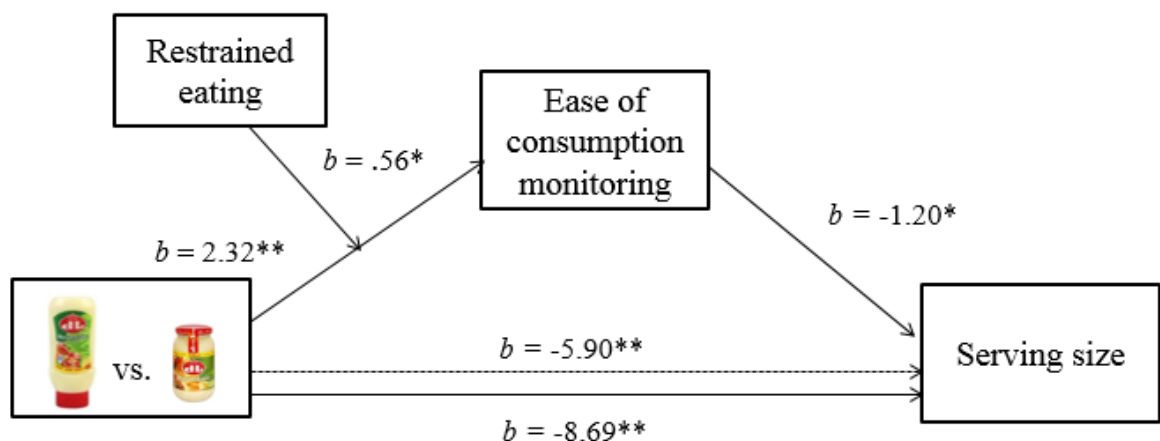
perceptions of the mayonnaise did not differ across the three conditions ($F(2,105) = .71, p = ns$).

Figure 3. Mayonnaise serving size of squeeze tube, traditional container, and adapted squeeze tube (Study 3)



Finally, we tested our prediction that the ease of consumption monitoring was underlying the squeeze tube effect and that the effect would be greater for unrestrained than for restrained eaters. To this end, we ran a moderated mediation analysis, with the normal squeeze tube versus the jar as the independent variable, serving volume as the dependent variable, ease of consumption as a mediator, and restrained eating as a moderator (Figure 4).

Figure 4. Moderated mediation model (Study 3)



$p^* < .05$; $** p < .001$

With a test of moderated mediation (Preacher & Hayes, 2008), we assessed the strength of the hypothesized indirect effect, conditional on the value of the moderator (i.e., restrained vs. unrestrained eaters). We focused on the effect of the easy-to-handle (regular squeeze tube) vs. less easy-to-handle (jar) package on consumption, with ease of consumption monitoring as a mediator of which the a path is moderated by restrained eating. A 5,000-resample bootstrap analysis indicated a significant conditional indirect (i.e., moderated mediation) effect at the $p < .05$ level for participants scoring low on the restrained eating scale (i.e., unrestrained eaters) (95% confidence interval [CI] .40 to 3.96, effect size = 1.84). That is, the easy-to-handle packaging made monitoring easier ($a = 2.32$, $p < .001$), which led to smaller serving sizes ($b = -1.20$, $p < .05$). For participants scoring high on the restrained eating scale (i.e., restrained eaters), the indirect effect was not significant (95% CI, -.02 to 2.28). In line with our expectations, for these eaters, packaging had no effect on serving sizes.

6. GENERAL DISCUSSION

The results from a series of three studies provide consistent evidence for our proposition that using squeeze tubes, versus traditional containers, decreases the serving sizes that consumers choose for themselves, and that the ease of monitoring drives this effect. Because squeeze tubes increase the ease of monitoring, consumers serve themselves less of the product. Being an unrestrained (restrained) eater enhances (attenuates) this effect: Whereas

restrained eaters already pay attention to their serving sizes and are used to monitoring both easy-to-handle squeeze tubes and less easy-to-handle jars, unrestrained eaters greatly benefit from their use of squeeze tubes, because they see the volume of the product steadily increasing on their plate while squeezing the tube.

All three studies provide strong support for our main proposition and rely on actual behavioral data, but each study also makes a unique contribution. Study 1 provides the initial evidence for the proposed effect, showing that consumers use less baking butter to fry an egg when it comes in a squeeze tube. Study 2, with a different product, shows that people put less mayonnaise on their plate when it comes in a squeeze tube. This study also controls for the substance, healthiness perceptions, and product orientation (vertical vs. horizontal) as potential confounding variables. Finally, Study 3 pinpoints the ease of monitoring as a determinant of the packaging effect, while also identifying (un)restrained eating as a boundary condition.

6.1 Theoretical contributions

This manuscript contributes to marketing theory in several ways. First, previous research on product packaging mainly focuses on visual attributes (Harris, Schwartz & Brownell, 2009), sizes (Chandon & Wansink, 2002; Wansink, 1996), or promotions (Mishra & Mishra, 2011). We extend this stream by identifying user-friendly packaging as a key attribute, with substantial implications for the serving sizes consumers choose. Promoting a product to the ultimate consumer and protecting it from damage during shipping once were the main functions of a product package, but user-friendly packaging is becoming more important to consumers. Demand for and supply of squeeze tubes is likely to increase further, in line with their product differentiation and convenience advantages. Therefore, we needed more knowledge on how squeeze tubes affect consumers' serving sizes.

Second, by comparing an easy-to-handle package against a more traditional package, we add to consumption monitoring literature and theory about how people reduce discrepancies between their perceived and actual consumption (Baumeister 2002; Carver & Scheier 1998; Polivy et al., 1986). Extant consumption monitoring research focuses almost exclusively on the impact of visual cues, such as package sizes (Coelho do Vale et al., 2008) or material (Deng & Srinivasan, 2013). We show that the ease of handling the package also affects the ease of consumption monitoring, because the product's substance—not the packaging per se—becomes more prominent for the consumer.

Third, we add to extant literature regarding the influence of restrained eating (e.g., Cavanagh & Forestell, 2013; Rogers & Hill, 1989; Scott et al., 2008). Rather than focusing on the impact of visual cues, such as food labeling (Cavanagh & Forestell, 2013), brand information (Rogers & Hill, 1989), or package sizes (Scott et al., 2008), we reveal that the effect of the ease of handling the package, through the ease of monitoring, on consumers' serving sizes is moderated by (un)restrained eating.

Fourth, we contribute to motor fluency theory (e.g., Alter & Oppenheimer, 2009; Beilock & Holt, 2007; Elder & Krishna, 2012; Ping et al., 2009), in that our comparison of an easy-to-handle package with a more traditional package reveals that motor fluency does not explain our results. If motor fluency were the driving factor, we should have found increased serving sizes when participants used the squeeze tubes. With these insights, we thus respond to calls for more research and a better understanding of how product manufacturers might influence consumers' serving size choices, through their packaging designs.

6.2 Consumer, public policy, and managerial implications

This research has important implications for understanding the potential contributors to overeating, as well as for defining optimal packaging strategies. Being obese or overweight has an adverse impact on people's quality of life, with significant psychological (Falkner et al., 2001; Puhl & Heuer, 2010), sociological (Brownell, Puhl, Schwartz, & Rudd, 2005; Christakis & Fowler, 2009), and economic (Finkelstein, Trogon, Cohen, & Dietz, 2009) costs. The emphasis on the obesity epidemic in both popular media and public policy campaigns thus confronts consumers with vast amounts of information about their food decisions and diet consciousness. Many consumers pursue health goals but also fail to resist the many temptations that surround them. Therefore, strategies other than simply promoting the pursuit of health might be more effective. In this sense, our study findings offer consumers an effective tool for decreasing their servings of unhealthy products: Changing the type of packaging they use might help them avoid overconsumption of such products.

Product manufacturers can also benefit from our findings. They have vested interests in understanding the effects of ease of product handling on the serving sizes that consumers choose. Product manufacturers have control over the extent to which they promote their products in squeeze tubes. By raising consumers' awareness of squeeze tubes, manufacturers might persuade them to purchase the easy-to-handle packages while also contributing to consumer welfare. Nudging consumers to buy squeeze tubes might hurt manufacturers

initially, in that overall consumption likely would decrease, but these efforts also could help product manufacturers address the criticism that they contribute to obesity rates with their practices. Young and Nestle (2002) allege that manufacturers have induced larger food sizes, noting that portion sizes began to grow in the 1970s, rose abruptly in the 1980s, and have grown in parallel with average body weights. Encouraging consumers to adopt more healthy purchase patterns could grant product manufacturers a compelling opportunity to improve consumers' food choices while also bolstering their brand image. It is manufacturers' responsibility to acknowledge how packaging influences consumer behavior, long after it influences purchases.

6.3 Limitations and further research

This study has several limitations that suggest avenues for research. First, we conducted all three studies in the same European country. Obesity rates, the relative prices of squeeze tubes and traditional containers, healthiness perceptions, (un)restrained eating attitudes, and adoption rates for squeeze tubes all might vary across countries, which suggests that the impact of squeeze tubes, through the ease of consumption monitoring, on consumers' serving sizes might differ across countries too. Further research should seek to replicate our findings across countries. The impact of consumption monitoring already has been demonstrated in a North American context (Giner-Sorolla, 2001; Polivy et al., 1986; Scott et al., 2008; Wertenbroch, 1998), so we predict that the differences we observed in this European context hold in other Western nations as well.

Second, our lab studies used data gathered from a single consumption context. Participants in Study 1 had access to the product the whole time and could replenish their cooking with as much butter as they wanted, but participants in Studies 2 and 3 took the product upfront and did not have the option to replenish the mayonnaise on their plate later. Additional research also should consider more long-term effects and investigate whether the decrease in consumers' serving sizes when they used squeeze tubes persists over time, according to retail data.

Third, our studies focus on relatively unhealthy products, for which most consumers want to restrict their consumption. It would be interesting to see whether this packaging effect also applies to healthy foods in squeeze tubes.

7. REFERENCES

- Alter, A. L., & Oppenheimer, D. M. (2009). Uniting the tribes of fluency to form a metacognitive nation. *Personality and Social Psychology Review*, 13(3), 219–235.
- Alter, A. L., Oppenheimer, D. M., Epley, N., & Eyre, R. N. (2007). Overcoming intuition: Metacognitive difficulty activates analytic reasoning. *Journal of Experimental Psychology*, 136(4), 569–576.
- Baumeister, R. F. (2002). Yielding to temptation: Self-control failure, impulsive purchasing, and consumer behavior. *Journal of Consumer Research*, 28(4), 670–676.
- Beilock, S. L., & Holt, L. E. (2007). Embodied preference judgments: Can likeability be driven by the motor system? *Psychological Science*, 18(1), 51–57.
- Bharat Book Bureau (2015). Tube & stick packaging market demand in the US to 2018. Retrieved July 29, 2015, from <http://prsync.com/bharat-book-bureau/tube--stick-packaging-market-demand-in-the-us-to--663252/>
- Brownell, K. D., Puhl, R.M., Schwartz, M.B., & Rudd, L. (2005). *Weight bias: Nature, consequences, and remedies*. New York: Guilford Press.
- Carver, C. S., & M. F. Scheier (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.
- Cavanagh, K. V., & Forestell C. A. (2013). The effect of brand names on flavor perception and consumption in restrained and unrestrained eaters. *Food Quality and Preference*, 28(2), 505–509.
- Cavanagh, K.V., Kruja, B., & Forestell, C.A. (2014). The effect of brand and caloric information on flavor perception and food consumption in restrained and unrestrained eaters. *Appetite*, 82, 1–7.
- Chandon, P., & Wansink, B. (2002). When are stockpiled products consumed faster? A convenience–salience framework of postpurchase consumption incidence and quantity. *Journal of Marketing Research*, 39(3), 321–335.
- Christakis, N. A., & Fowler, J.H. (2009). The spread of obesity in a large social network over 32 years. *New England Journal of Medicine*, 357(3), 370–379.
- Coelho do Vale, R., Pieters, R., & Zeelenberg, M. (2008). Flying under the radar: Perverse package size effects on consumption self-regulation. *Journal of Consumer Research*, 35(3), 380–390.

- Deng, X., & Srinivasan, R. (2013). When do transparent packages increase (or decrease) food consumption? *Journal of Marketing*, *77*(4), 104–117.
- Elder, R. S., & Krishna, A. (2012). The visual depiction effect in advertising: Facilitating embodied mental simulation through product orientation. *Journal of Consumer Research*, *38*(6), 998–1003.
- Falkner, N. H., Neumark-Sztainer, D., Story, M., Jeffery, R.W., Beuhring, T., & Resnick, M. D. (2001). Social, educational, and psychological correlates of weight status in adolescents. *Obesity Research*, *9*(1), 32–42.
- Fang, X., Singh, S., & Ahluwalia, R. (2007). An examination of different explanations for the mere exposure effect. *Journal of Consumer Research*, *34*(1), 97–103.
- Finkelstein, E. A., Trogdon, J. G., Cohen, J. W., & Dietz, W. (2009). Annual medical spending attributable to obesity: Payer- and service-specific estimates. *Health Affairs*, *28*(5), 822–831.
- Giner-Sorolla, R. (2001). Guilty pleasures and grim necessities: Affective attitudes in dilemmas of self-control. *Journal of Personality and Social Psychology*, *80*(2), 206–221.
- Harris, J.L., Schwartz, M.B., & Brownell, K.D. (2009). Marketing foods to children and adolescents: licensed characters and other promotions on packaged foods in the supermarket. *Public Health Nutrition*, *13*(3), 409-417.
- Kahn, B.E., & Wansink, B. (2004). The influence of assortment structure on perceived variety and consumption quantities. *Journal of Consumer Research*, *30*(4), 519–533.
- Mishra, A. & Mishra, H. (2011). The influence of price discount versus bonus pack on the preference for virtue and vice foods. *Journal of Marketing Research*, *48*(1), 196–206.
- Piaget J. (1969). *The mechanisms of perception*. London: Routledge & Kegan Paul.
- Ping, R. M., Dhillon, S., & Beilock, S. L. (2009). Reach for what you like: The body's role in shaping preferences. *Emotion Review*, *1*(2), 140–150.
- Polivy, J., Herman, C. P., Hackett, R., & Kuleshnyk, I. (1986). The effects of self-attention and public attention on eating in restrained and unrestrained subjects. *Journal of Personality and Social Psychology*, *50*(6), 1203–1224.
- Preacher, K. J., and Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in simple and multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891.
- Puhl, R. M., & Heuer, C. A. (2010). Obesity stigma: Important considerations for public health. *American Journal of Public Health*, *100*(6), 1019–1028.

- Raghubir, P., & Krishna A. (1999). Vital dimensions in volume perception: Can the eye fool the stomach? *Journal of Marketing Research*, 36, 313–326.
- Rogers, P. J., & Hill, A. J. (1989). Breakdown of dietary restraint following mere exposure to food stimuli: interrelationships between restraint, hunger, salivation, and food intake. *Addictive Behaviors*, 14(4), 387–397.
- Scott, M. L., Nowlis, S., Mandel, N., & and Morales, A.C. (2008). The effects of reduced food size and package size on the consumption behavior of restrained and unrestrained eaters. *Journal of Consumer Research*, 35(3), 391–405.
- Strack, F., Martin, L. L., & Stepper, S. (1988). Inhibiting and facilitating conditions of the human smile: A nonobtrusive test of the facial feedback hypothesis. *Journal of Personality and Social Psychology*, 54(5), 768.
- Tversky, A., & Kahneman, D. (1974). Judgement and uncertainty: Heuristics and biases. *Science*, 185(4157), 1124–1131.
- van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch eating behavior questionnaire (DEBQ) for assessment of restrained, emotional and external eating behavior. *International Journal of Eating Disorders*, 5, 747-755.
- Wansink, B. (1996). Can package size accelerate usage volume? *Journal of Marketing*, 60, 1–14.
- Wansink, B. (2004). Environmental factors that increase the food intake and consumption volume of unknowing consumers. *Annual Review of Nutrition*, 24, 455–479.
- Weijters, B., Geuens, M., & Baumgartner, H. (2013). The effect of familiarity with the response category labels on item response to Likert scales. *Journal of Consumer Research*, 40(2), 368-381.
- Wertenbroch, K. (1998). Consumption self-control by rationing purchase quantities of virtue and vice. *Marketing Science*, 17(4), 317–337.
- Winkielman, P., Schwarz, N., Fazendeiro, T., and Reber R. (2003). The hedonic marking of processing fluency: Implications for evaluative judgment. In Musch, J. & Klauer, K.C., eds. *The Psychology of Evaluation: Affective Processes in Cognition and Emotion* (pp. 189–217). Mahwah, NJ: Erlbaum.
- World Health Organization (2014). Obesity and overweight. Retrieved June 3, 2015, from <http://www.who.int/mediacentre/factsheets/fs311/en/>
- Young, L. R., & Nestle, M. (2002). The contribution of expanding portion sizes to the US obesity epidemic. *American Journal of Public Health*, 92(2), 246–249.

**CHAPTER V:
CLICKS AS A HEALTHY ALTERNATIVE TO
BRICKS: HOW ONLINE GROCERY SHOPPING
REDUCES VICE PURCHASES**

CHAPTER V: CLICKS AS A HEALTHY ALTERNATIVE TO BRICKS: HOW ONLINE GROCERY SHOPPING REDUCES VICE PURCHASES²

Although consumers are concerned about their health, obesity statistics suggest that contextual factors often lead them to choose unhealthy alternatives (i.e., vices) rather than healthy ones (i.e., virtues). Noting the increasing prevalence of online grocery shopping, the authors focus on shopping channels as one such contextual factor and investigate how food choices made online differ from food choices made in a traditional brick-and-mortar store. A database study and three lab experiments demonstrate that consumers choose relatively fewer vices in the online shopping environment. Moreover, this shopping channel effect arises because online channels present products symbolically, whereas offline stores present them physically. A symbolic presentation mode decreases the products' vividness, which in turn diminishes consumers' desire to seek instant gratification and ultimately leads them to purchase fewer vices. These findings highlight several unexplored differences between online and offline shopping, with important implications for consumers, public policy makers, and retailers.

² Chapter V is published as "Huyghe, E., Verstraeten, J., Geuens, M., and Van Kerckhove, A. (2016). Clicks as a Healthy Alternative to Bricks: How Online Grocery Shopping Reduces Vice Purchases. *Journal Marketing Research*, forthcoming."

Imagine a consumer who decides to order groceries from an online store instead of visiting a traditional, brick-and-mortar grocery store to purchase the items. Does this shopper buy different products online versus offline? Specifically, do vices—tempting products that typically render short-term benefits (e.g., tastiness) but have fewer long-term benefits (e.g., healthiness; Khan and Dhar 2007; Wertenbroch 1998)—make up relatively more or less of a consumer’s shopping basket when he or she orders online rather than buying offline? Despite the theoretical, societal, and practical relevance of such questions, no research to date has addressed them.

The relevance of these questions is particularly clear when we consider the alarming obesity rates worldwide (e.g., over 50% of U.S. adults are overweight or obese; Ogden et al. 2014; World Health Organization 2014). Prior research has demonstrated that shelf arrangements (van Kleef, Otten, and van Trijp 2012), assortment size (Sela, Berger, and Liu 2009), and choice set compositions (i.e., healthy and unhealthy options presented in a unified versus separate choice set; Fishbach and Zhang 2008) exert significant impacts on consumers’ decisions to purchase vices. These previous studies thus note different product presentations *within* a single retail channel but ignore the question of whether different retail channels affect consumers’ choices, that is, *between*-channel differences. Yet product presentations online versus offline differ fundamentally, such that they likely have differential impacts on purchase behavior. In addition, online grocery shopping is becoming increasingly common—in one 2012 survey, consumers expressed 44% higher intentions to shop online for food and beverages compared with the 2010 rates (ACNielsen 2012)—which suggests great urgency in the pursuit of a better understanding of the potential impact of this channel, as well as the substantial potential relevance of findings in this realm.

We argue that consumers’ shopping baskets contain relatively fewer vices when they shop online, versus offline, because of the inherent difference in their presentation: An online store presents products symbolically, using pictures, whereas offline stores present them physically. This symbolic product presentation induces sensory distance, which decreases the products’ vividness and renders immediate gratification less important (Hoch and Loewenstein 1991; Loewenstein 1996; Mischel and Ebbesen 1970; Shiv and Fedorikhin 1999, 2002). Because consumers sense less gratification from symbolic, less vivid product presentations, they may purchase relatively fewer vices in an online shopping environment than in an offline grocery store.

Highlighting this unexplored difference between online and offline shopping environments represents an important theoretical contribution, but the notion that online (vs.

offline) shopping channels could limit the purchase of vices also has societal and practical significance. The persistence of the obesity epidemic indicates that many consumers struggle to limit their intake of vices. Marketing actions by supermarkets and food manufacturers often effectively trigger consumers to select more indulgent food products (Dubé et al. 2010; Kessler 2009; Pollan 2006; Popkin 2002). In confirming our prediction that shopping online (relative to shopping offline) decreases the focus on immediate gratification, which leads consumers to choose fewer vices, this study offers substantive relevance for retailers, public policy makers, and consumers. We present a theoretical background for our research and develop our hypotheses in the next section. After we present a database study and three experimental studies, we discuss the results, then outline our theoretical contributions and conclude with practical implications and suggestions for future research.

1. THEORETICAL BACKGROUND

1.1 Differences Between Online and Offline Shopping Environments

Online and offline shopping environments differ in several ways. In an online environment, information search costs are lower, because it is easy to screen information and form a consideration set, more information is available, and product assortments across websites are broader. In addition, consumers can easily repurchase products saved on personal shopping lists. However, perceived risk tends to be higher (Alba et al. 1997; Bart et al. 2005; Danaher, Wilson, and Davis 2003; Huang, Lurie, and Mitra 2009). By contrast, in an offline store, consumers can touch and feel the merchandise and even taste some food products, which is important to obtain information about experience attributes that can be evaluated only after consumption (Nelson 1974). In addition, the store atmospherics in offline stores might make offline shopping more fun, though a crowded store also can lead to irritation, annoyance, or greater time demands. Brick-and-mortar stores also do not require order lead time.

Although many articles highlight such differences, empirical studies of their impacts on consumers' purchase behavior are scarce, with a few notable exceptions that investigate brand loyalty and price sensitivity. For example, high market share brands enjoy a loyalty advantage when consumers buy online rather than offline (Danaher, Wilson, and Davis 2003). Chu, Chintagunta, and Cebollada (2008) also find that households demonstrate lower price sensitivities if they shop online rather than offline. Other extant research does not offer a

direct comparison of online versus offline shopping channels but still considers the impact of various elements, such as order lead time (Milkman, Rogers, and Bazerman 2010) and payment method (Bagchi and Block 2011; Thomas, Desai, and Seenivasan 2011), that tend to differentiate online and offline stores.

Beyond these insights, we propose that the distinct product presentations in online and offline shopping environments (i.e., symbolic in online channels, physical in offline stores) are relevant, especially in a grocery shopping context. For vices—which in a grocery context we define as attractive but unhealthy products—product presentations could determine consumer preferences and purchase behaviors, such that the symbolic (vs. physical) presentation of products might reduce consumers' vice purchases. Although our study of the impact of product presentation mode on consumers' vice purchases focuses on common grocery shopping situations, in which consumers rarely directly trade off the benefits and downsides of vices and virtues, for our theorizing we do draw on extant research which almost exclusively studies vice choices in binary choice contexts.

1.2 Visceral Choice of Vice Products

In a binary choice context, consumers have difficulties choosing a virtue option that aligns with their desire to live a long and healthy life (e.g., fruit salad) due to the presence of an immediately tempting vice option (e.g., chocolate cake). This choice problem constitutes a self-control dilemma, such that the tension consumers experience highlights the inherent conflict between their affective and reflective behavioral systems (Loewenstein 1996; Metcalfe and Mischel 1999). As research in this domain notes, regulating vice choices is challenging for many consumers, because their visceral responses to vice products tend to be strong and automatic in nature (Shiv and Fedorikhin 1999), and cognitive resources to override these visceral responses may be (temporarily) unavailable (Vohs and Heatherton 2000).

The likelihood of choosing vices over virtues thus depends on the strength of activation of the affective behavioral system, as well as the level of willpower exerted through the reflective system on the affective system. Loewenstein (1996) also suggests that the intensity of affective reactions to a certain product is contingent on the vividness of the product's presentation, which refers to the amount of detail that is provided for sensory inspection to form a mental image of the product. If a product's presentation is more vivid, not only will the mental image of the product be more detailed, but also the sensory gratification that results

from consuming the product becomes more palpable and desirable. Hence, with more vivid product presentations it becomes easier for consumers to sense the gratification that will arise from consuming it. The more consumers sense this awaiting gratification, the more intense their affective reactions to the product will be, which facilitates behavioral actions based on visceral responses rather than cognition and as such increases consumers' proneness to choose vices. In sum, research studying consumers' choices in a binary choice context thus suggests that less vivid product presentations diminish consumers' focus on immediate gratification which renders them less prone to choose vices. In the next section, we argue that online and offline shopping contexts are characterized by differences in the vividness of product presentations.

1.3 Symbolic Versus Physical Product Presentation

We first discuss research on the effects of products being physically absent versus present—rather than symbolically versus physically present—because the former operationalization of the vividness of product presentations is most prevalent in extant research. For example, Mischel and Ebbesen (1970) show that children who were asked to voluntarily delay rewards, such as marshmallows, cookies, and pretzels, expressed far less willingness to wait for a preferred reward when a less preferred option was physically present. That is, reward objects trigger more intense desire when they are physically present (vs. absent), because this presentation makes the objects more vivid to the children, which helps them to imagine and sense the gratification associated with consuming the reward (Loewenstein 1996).

Related findings affirm that the mere sight of food intensifies visceral responses, such as increasing reported hunger (Bossert-Zaudig et al. 1991) and salivation (Hill, Magson, and Blundell 1984). Similarly, because stockpiled products are visually salient, they evoke more intense visceral responses, which increase consumption frequency (Chandon and Wansink 2002; Wansink and Deshpande 1994). Delaying gratification is thus more difficult for consumers who encounter the physical product.

More recent research shows that when the product presentation mode varies between symbolic and physical (rather than absent versus present) similar effects on food resistance and decision making emerge. Presenting visually attractive food in an opaque rather than a transparent package, for example, leads consumers to eat less of the food (Deng and Srinivasan 2013). Similar to physically absent products, symbolic product presentations (e.g.,

pictures) are higher in sensory distance, and their vividness decreases accordingly, as compared with products presented physically (Kardes, Cronley, and Kim 2006). Translating the foregoing to a shopping context, we anticipate that it is more arduous for consumers to experience products' sensorial aspects in an online shopping environment because of their symbolic presentation in this channel. In line with this Degeratu, Rangaswamy, and Wu (2000) show that sensory search attributes, and especially visual cues (e.g., packages), have less impact in an online than an offline shopping environment. Also, the recognition that symbolic (vs. physical) product presentations decrease consumers' reliance on affect may then explain why consumers who shop online tend to experience less intense affect (van Noort 2008).

As the foregoing paragraphs show that the product presentation mode (symbolic versus physical presentation) can have pervasive influences on consumers' sensory experiences and product choice, we expect the proportion of vices in consumers' shopping baskets to change depending on the shopping channel. Specifically, if symbolic presentations are less vivid and decrease sensory imagery, this should diminish consumers' desire for immediate gratification leading them to purchase relatively fewer vices online than offline. On the basis of this reasoning, we hypothesize:

H₁: Consumers' shopping baskets contain relatively fewer vices when they shop in an online compared with an offline environment.

H₂: Product presentation mode (symbolic vs. physical) exerts a main effect on the relative purchase of vices, regardless of the shopping environment: Consumers' shopping baskets contain relatively fewer vices when products are symbolically (vs. physically) presented.

Thus with H₂, we suggest that the difference between online and offline shopping baskets in terms of consumers' relative vice purchases is actually due to the difference in presentation mode (symbolic vs. physical). Hence, the difference between online and offline shopping baskets should disappear when the products' presentation mode changes, either online or offline, such that they are symbolically present offline or physically present online. That is, presenting products symbolically (instead of physically) in an offline shopping environment should thus decrease vice purchases and when consumers order groceries online

and products are made physically present (instead of symbolically) their vice purchase can be expected to increase.

Building on existing literature related to the effect of presentation mode on vividness and gratification seeking (Shiv and Fedorikhin 1999, 2002), and assuming that the products' presentation mode drives the effect of online versus offline shopping on vice purchases (H₂), we further postulate the following serial mediation effect:

H₃: In an online (vs. offline) shopping environment, the vividness of product presentations is lower, which diminishes consumers' ability to immediately sense gratification, leading them to purchase relatively fewer vices.

With these predictions, this research attempts to resolve some gaps in existing research into product presentation modes. First, prior research mostly builds on forced, binary choice tasks, such that participants had to choose between a vice and a virtue (e.g., Dhar and Wertenbroch 2000; Shiv and Fedorikhin 1999, 2002). In real-world grocery shopping contexts, though, consumers rarely trade off vices and virtues directly. The question thus remains to what extent these prior results apply to less strictly confined real-world grocery purchase decisions. Second, extant literature builds almost exclusively on comparisons between a product presentation that can provide immediate, full, sensory information (e.g., exposure to unpackaged food products) and one that provides only partial sensory information (e.g., opaquely packaged goods, pictorial presentations). When shopping though, consumers rarely obtain full sensory product information, because most consumer goods are packaged in stores (e.g., packaging for 80% of chips, 80% of cookies, 77% of crackers, and 23% of nuts is opaque; Deng and Srinivasan 2013), and online channels only use pictorial presentations. Thus it is not clear to what extent differences in the degree of sensory distance (i.e., [opaquely] packaged goods vs. pictorial presentations) have similar effects. By using actual shopping data, both online and offline, and complementing them with experimental studies that mimic online and offline stores, we seek to avoid potential external validity problems while also maximizing internal validity.

Specifically, we report differences in actual shopping behavior, to emphasize the importance and relevance of the focal phenomenon. Using data linked to the customer loyalty cards of a large European retailer, we demonstrate that the same customers spent relatively less on vices when they ordered online rather than shopping offline (Study 1). We replicate this finding in three controlled, laboratory experiments in which we rule out several

confounds that exist in real online and offline shopping environments, such as differential exposures to grocery products (Study 2), payment modes (Study 3), and order lead time (Study 4). We also provide empirical evidence that products' presentation is the underlying source of different vice purchases in online versus offline channels (Study 3), because it affects products' vividness and consumers' desire for immediately gratifying products (Study 4).

2. STUDY 1

To gain preliminary evidence of the hypothesized effect of online versus offline grocery shopping on the purchase of vices, we analyzed data from a large European retailer that operates both a chain of brick-and-mortar grocery stores and an online store. Online and offline stores differ on several characteristics, in addition to presentation mode, that may influence consumers' relative spending on vices. However, the online and offline stores of the retailer that participated in this study are equivalent in three important elements. First, the same assortment of grocery products is available at the same prices in both online and offline channels. Second, the retailer only provides pick-up services for online purchases, not delivery, so customers who order groceries online must pick up their groceries from a brick-and-mortar store. Therefore, whether customers shop online or offline, they still must deal with the challenges of transporting their purchases. Third, no advance payment is available for orders placed online. For both online and offline purchases, payment must occur in cash or with a debit card in the brick-and-mortar store. This identical payment method online and offline is important, because extant research shows that payment method exerts an effect on vice purchases (Bagchi and Block 2011; Thomas, Desai, and Seenivasan 2011).

2.1 Data

The retailer's customer database contains information about all customers who possess the retailer's loyalty card. These customers consist of three groups: (1) those who purchase groceries exclusively by frequenting the retailer's offline stores, (2) those who buy exclusively through the retailer's online store, and (3) those who buy online on some occasions and offline on others. The retailer provided data about a random sample of 10% of each type of shoppers, including their grocery purchases over a period of four months (January–April) in 2013. Because customers who buy exclusively in a single channel likely

differ markedly from customers who purchase exclusively in the other channel (e.g., online grocery customers tend to be older, more educated, and wealthier; Morganosky and Cude 2002), we follow prior research and focus on mixed channel customers who shop both online and offline (Chu et al. 2010; Chu, Chintagunta, and Cebollada 2008; Pozzi 2013; Shankar, Smith, and Rangaswamy 2003). In total, we obtained information about 32,363 shopping trips by 4,313 different mixed channel shoppers. Most of their shopping trips (64.81%) were offline. The average monetary value of shopping baskets online ($M_{\text{Online}} = \text{€}167.33$) was greater than those purchased offline ($M_{\text{Offline}} = \text{€}120.46$). These observations align with evidence in prior research (Chu, Chintagunta, and Cebollada 2008; Pozzi 2013).

The database provides detailed information about purchases in five typical vice categories: (1) salty snacks, (2) chips, (3) chocolate, (4) candy bars, and (5) sweets and chewing gum (Hui, Bradlow, and Fader 2009; Milkman, Rogers, and Bazerman 2010). For each shopping trip by each customer, the data indicate the specific products they purchased in all five categories and the price of each product, complemented by aggregated shopping trip information (i.e., total amount spent and shopping channel used). Because most products are available in various package sizes, merely comparing the number of vices packages purchased might provide a distorted view. Instead, we compared online and offline purchases on the basis of the amount of money spent on vices, relative to the monetary value of the total basket, rather than the number of vices in the shopping baskets.

2.2 Results

Because the data set comprises information about multiple shopping trips by each customer, we need a multilevel analysis that takes the hierarchical data structure into account (Bryk and Raudenbush 1992; Snijders and Bosker 1999). The amount of money spent on vices relative to the total amount spent on a shopping trip served as the dependent variable, and shopping channel (online versus offline) was the independent variable. To account for customer-level effects, we estimated both the intercept and the slope randomly. That is, a fixed-effects model yielded a -2 restricted log-likelihood value (-2LL) of $-47,477.65$, but the model fit improved significantly when we allowed for a random intercept estimation (-2LL = $-48,600.52$; $\Delta\chi^2 = 1,122.87$, $\Delta df = 1$, $p < .001$). Model fit improved even further when we allowed the slope of the shopping channel to vary for each customer, such that the -2LL reached $-48,965.85$ ($\Delta\chi^2 = 365.33$, $\Delta df = 1$, $p < .001$). Moreover, the analysis indicated a significant difference in the relative amount of money spent on vices during shopping trips

undertaken online versus offline. Mixed channel shoppers dedicated a smaller share of their expenses to vices when they bought groceries online ($M_{\text{Online}} = .057$, $SD = .058$) rather than offline ($M_{\text{Offline}} = .104$, $SD = .133$; $F(1, 4575.73) = 823.42$, $p < .001$). Total spending is generally higher in online versus offline shopping environments, so we also ran a series of multilevel analyses with different cut-off levels for the total value of the receipts, as we detail in Table 1. The same conclusion holds for the different cut-off levels, so the difference in relative spending on vices is not driven by variations in total spending.

Table 1. Mixed Channel Customers' Mean Relative Vice Expenses at Different Total Spending Levels (Study 1)

Total Expenses	Number of Receipts	Number of Customers	M_{Online}	M_{Offline}	F	p -Value
No cut-off	32,363	4,313	.057	.104	823.42	<.001
≤ € 500	32,181	4,308	.057	.104	824.13	<.001
≤ € 400	31,928	4,305	.057	.104	810.33	<.001
≤ € 300	30,892	4,180	.058	.104	776.27	<.001
≤ € 200	26,260	3,517	.060	.110	691.60	<.001
≤ € 100	11,576	1,196	.075	.150	303.99	<.001
≤ € 50	4,153	284	.121	.224	33.80	<.001

At the category level, we also did not find any differences across the five vice product categories. That is, the amount of money customers spent in each category, relative to the total amount they spent on a shopping trip, was significantly lower in online shopping trips than in offline ones (see Table 2). These detailed analyses illustrate that the difference in the relative amount spent on vices, online versus offline, represents a stable observation that is not driven by purchases in any particular vice product category.

Table 2. Mixed Channel Customers' Mean Relative Expenses in Five Vice Categories (Study 1)

Product Category	M_{Online}	M_{Offline}	F	p-Value
Candy bars	.045	.067	128.13	< .001
Chocolate	.049	.092	376.74	< .001
Chips	.026	.040	188.24	< .001
Sweets and chewing gum	.039	.063	146.87	< .001
Salty snacks	.017	.032	127.53	< .001

Beyond customers who shop both online and offline, we obtained the same substantive conclusions when comparing the grocery purchases of customers who exclusively ordered their groceries online against those who exclusively shopped offline: Customers who ordered their groceries online purchased fewer vices ($M_{\text{Online}} = .056$, $SD = .050$) than those who bought their groceries offline ($M_{\text{Offline}} = .111$, $SD = .135$; $F(1, 186010.35) = 543.53$, $p < .001$). The same conclusion also holds at different cut-off levels for total expenses and for all five vice product categories (see Web Appendix A).

2.3 Discussion

Study 1 lends support to our prediction in H_1 that consumers' shopping baskets comprise relatively fewer vices when those consumers shop online rather than offline. Specifically, mixed channel shoppers, who bought groceries online and offline, spent relatively less on vices when they shopped online than when they purchased offline. This difference arose for both the combination of five vice categories and each category separately, which underscored the robustness of the finding.

This study used actual shopping data, such that the results possess strong external validity. However, these data also create some limitations. First, vices cover a broader range of product categories than the five we considered. Notable vice products such as fast food, soft drinks, biscuits, pastries, and dairy desserts were missing from Study 1 (Hui, Bradlow, and Fader 2009; Milkman, Rogers, and Bazerman 2010). This study also hinges on the assumption that the products in these five categories are vices to the same extent, similar to

prior research. However, a more nuanced view might be obtained from measuring consumers' perceptions of the extent to which products are vices (Thomas, Desai, and Seenivasan 2011).

Second, the data set did not provide any insights into what customers purchased, other than products in the five predefined vice categories. Thus, we could not evaluate what products also appeared in their shopping baskets or determine the influence of other purchase determinants. For example, because we analyzed purchase differences as they arose in a natural setting, the obtrusive presence of store atmospherics in brick-and-mortar stores (e.g., background music, free food samples, point-of-purchase promotions) might have confounded our results, by boosting the offline sales of certain products (Turley and Milliman 2000).

Third, customers might engage in online shopping trips for different reasons than those that prompt them to shop offline, as indicated by previous research (Rohm and Swaminathan 2004). Study 1 does not allow us to exclude shopping motives as an alternative explanatory factor. However, we have reason to believe that shopping motives had limited influences on this study. In particular, when we compared customers who exclusively buy online with those who exclusively buy offline, we obtained the same substantive conclusions, even though shopping motives should be less different between these two groups than they are for customers who respond to various motives by alternating between channels. We also obtained similar results when we repeated the analyses for different levels of total spending. Our specific study setting diminishes this concern too, because the retailer only offers a pick-up service, not a home delivery service, which reduces the likelihood that customers buy fundamentally different products (e.g., heavy, bulky items) online versus offline.

Fourth, natural online and offline shopping contexts create distinct time intervals between the moment of purchase and potential consumption. Groceries purchased online are subject to an order lead time that delays their consumption, for anywhere from a couple of hours to several days, whereas those bought offline can be consumed immediately. Because vices generally serve immediate gratification motives, this difference might be pertinent in Study 1 (Milkman, Rogers, and Bazerman 2010).

Fifth, the differential exposure to grocery products in online versus offline settings might have affected this study's results. In online grocery stores, the homepage typically organizes products into categories (e.g., confectionary, fruit and vegetables). Customers thus might be exposed to fewer products when they order groceries online, compared with purchasing groceries offline, because if they choose not to click on a certain product category (e.g., confectionary), they do not encounter any of these products. Noting these findings and

limitations, we seek to confirm the support for our hypotheses while also addressing Study 1's shortcomings with controlled laboratory experiments.

3. STUDY 2

The purpose of Study 2 is threefold. First, we seek to replicate the results of Study 1 in a laboratory experiment, so that we can control for the effects of store atmospherics, shopping motives, and order lead time. Second, we aim to rule out differential exposures to grocery products in online and offline channels (i.e., online consumers only encounter products in categories on which they click, offline consumers encounter various products unintended while wandering around the store) as an alternative explanation for the observed difference in vice purchases. Third, in contrast with Study 1's focus on the relative amount of money spent on five product categories that are generally classified as vices, we seek to provide more stringent evidence of our proposition by (1) limiting the study to food items only, (2) including a wider range of vice categories, and (3) accounting for the extent to which consumers actually perceive the products as vices.

3.1 Method

3.1.1 Participants and design.

In total, 141 students (49 men; $M_{\text{age}} = 21.38$ years, $SD = 1.78$) from a large Western European university participated in this experimental lab study, in return for a small monetary compensation. To test whether shopping baskets contained relatively fewer vices when consumers shopped for groceries online (vs. offline) (H_1), we created a between-subjects design with two conditions (shopping channel: online vs. offline) that mimicked traditional online and offline shopping environments. To assess whether selective exposure to grocery products, as occurs in online shopping environments, affects the proportion of vices in shopping baskets, we also added a third condition, in which participants shopped online but were exposed to the grocery products in a way that matched the offline condition. That is, the homepage did not present verbal descriptions of product categories but instead featured pictures of products, organized in the same way as in the offline store (in Web Appendix B, it is the "online no categorization" condition). With this condition, we rule out a potentially confounding effect of different exposures to grocery products online and offline.

3.1.2 Procedure.

When they entered the lab, participants were informed that they would be participating in a “Food Shopping Study” with the ostensible goal of gaining insights into which types of food products consumers buy on typical shopping trips (Thomas, Desai, and Seenivasan 2011). To ensure identical purchase motives, all participants read the same scenario, which indicated they needed to shop for groceries for the next five days, with a budget of 50 euros and no food supplies left at home. Moreover, the instructions explicitly indicated that they were not required to spend their entire budget and only had to take their own needs or preferences into account. We then randomly assigned participants to one of the three conditions.

Participants assigned to the traditional offline shopping condition moved to another room, which contained a small experimental store with 107 products arranged on either the front or back of a retail shelf, organized into (unlabeled) categories (see Web Appendix B). These products were selected from the assortment of a small grocery store located near the university and covered the food categories frequently purchased by the student population that participated in this study (i.e., biscuits, bread, candy bars, soup, chocolate, chips, dairy desserts, dried pasta, fruit, meat, milk, salty snacks, soft drinks, sweets, vegetables, yogurt, and water; see Web Appendix B). Within each food category, we randomly selected several products. Neutral shelf tags indicated the products’ brand names and prices. Otherwise, the room was free of store atmospherics. Respondents put their chosen products in a shopping basket and proceeded to the checkout. One of the researchers recorded the chosen products and returned them to the shelves before the next participant arrived.

The participants randomly assigned to the online shopping conditions (traditional online or online no categorization) instead remained seated in front of a computer and shopped in an online grocery store, created specifically for this study. We kept the product assortment and prices constant across the online and offline conditions. In the traditional online condition, the store resembled a typical online grocery store, with products in nine broad product categories (e.g., chocolate, confectionary, dairy, fruit and vegetables). If they clicked on a product category, participants could view pictures of the products within that category. In the online no categorization condition, the homepage of the online store instead displayed pictures of the front and back sides of the shelves from the experimental store, such that all products appeared the same way they did in the offline condition (Web Appendix B). Participants clicked on pictures of a shelf to view any products on it more closely. Below the pictures, the

site indicated the product's brand name and price. Participants made their purchase decisions by placing products in their virtual shopping basket, then proceeded to the online checkout. Similar to the offline condition, the participants did not really receive the chosen products, so no order lead time effects should exist in either condition. Finally, all participants provided socio-demographic information, such as their age and gender.

3.1.3 *Grocery products' vice ratings.*

In contrast with Study 1, in which we classified products as vices if they belonged to one of five, typical vice categories, for Study 2 we sought to determine the extent to which the 107 available grocery products appeared to be vices. With a survey, we asked a different group of students to evaluate the grocery products on a vice–virtue continuum, after defining a vice as “something tempting that has few long-term benefits. It is something that you want but at the same time feel guilty choosing” and a virtue as “something that is not very tempting now but may be more beneficial in the long-run. It is something that you feel less guilty choosing” (adapted from Khan and Dhar 2007). In total, 77 students, recruited from the same university population (23 men; $M_{\text{age}} = 21.06$ years, $SD = 1.75$), completed this survey. Each respondent rated a random subset of 54 products on a one-item, nine-point semantic differential scale, anchored at 1 = “vice” and 9 = “virtue,” so all grocery products were rated about 40 times. We averaged these ratings and reversed them, to compute a vice rating for each product (see Web Appendix B).

3.1.4 *Dependent variables.*

We created two indices to reflect the extent to which shopping baskets contain vices (Thomas, Desai, and Seenivasan 2011). The first index is a simple average of the vice ratings of all products within the shopping basket(s). For example, if a basket contains 14 products, the index reflects the sum of the vice ratings of each of these products, divided by 14. A second index uses the relative amount of money spent on products within baskets, such that we weighted the effect of a product's vice rating on the index by the relative amount of money spent on that product. Thus if a product accounts for 10% of the monetary value of the shopping basket, the vice rating for that product takes a weight of .10. The former thus represents a *simple-average vice index* for the different elements of a shopping basket, while the latter also reflects the relative amount of money spent on items and therefore will be

referred to as the *weighted-average vice index*. These indices should be strongly correlated, as well as lower in the online than in the offline condition.

3.2 Results

After computing both indices for each participant ($r = .80$), we ran two analyses of variance (ANOVAs), each with one of the indices as the dependent variable and the randomly assigned condition (traditional offline vs. traditional online vs. online no categorization) as the independent variable. First, we evaluated the impact of differential exposures to grocery products, by zooming in on the two online conditions (traditional online vs. online no categorization). The results of the planned contrasts indicated that neither the average vice index ($M_{\text{Traditional online}} = 3.36$, $SD = .49$; $M_{\text{Online no categorization}} = 3.25$, $SD = .47$; $t(138) = 1.00$, $p = .32$), nor the weighted-average vice index ($M_{\text{Traditional online}} = 4.18$, $SD = .49$; $M_{\text{Online no categorization}} = 4.25$, $SD = .52$; $t(138) = -.63$, $p = .53$) differed significantly between the two online conditions, so differential exposures to grocery products did not appear to influence the purchase of vices.

Importantly, the remaining planned contrasts revealed that both these indices were significantly lower in the online conditions than in the offline one. The average vice index was lower when participants ordered groceries online ($M_{\text{Traditional online}} = 3.36$ and $M_{\text{Online no categorization}} = 3.25$) than when they shopped offline ($M_{\text{Offline}} = 3.70$, $SD = .67$; $t(138) = -2.89$, $p < .01$ and $t(138) = -3.98$, $p < .001$). We observed a similar pattern of results for the weighted-average vice index; this index was also lower for the baskets composed online ($M_{\text{Traditional online}} = 4.18$ and $M_{\text{Online no categorization}} = 4.25$) than for the ones composed offline ($M_{\text{Offline}} = 4.46$, $SD = .51$; $t(138) = -2.56$, $p = .01$ and $t(138) = -2.01$, $p < .05$). These results provide additional support for H_1 , because differential exposures to grocery products cannot account for the observed difference in vice purchases in these channels.

3.3 Discussion

With Study 2, we have explored the effect of shopping channels on the purchase of vices in a controlled laboratory setting. The results lend additional support to H_1 , in that both the average vice rating of the shopping basket (i.e., average vice index) and the relative amount of money spent on vices (i.e., weighted-average vice index) were significantly lower when participants shopped for groceries online rather than offline. Moreover, this study rules

out the potential confound associated with differential exposure to grocery products in online and offline channels. The proportion of vices in participants' shopping baskets did not differ significantly, whether the homepage of the online store depicted product categories, as is common in practice, or presented the products as they would appear on actual shelves in brick-and-mortar stores.

Although we used divergent methodologies in Studies 1 and 2, their findings converge to indicate that consumers buy relatively fewer vices when they shop for groceries in an online shopping environment. Because Study 2 included only food items and a broader variety of vice categories, while also accounting for consumers' perceptions of vice products, these results affirm the far-reaching consequences of shopping online or offline. Moreover, we obtained these results in a controlled setting, which enabled us to (1) induce similar shopping motives online and offline, with a scenario; (2) eliminate the effect of store atmospherics in both shopping environments; and (3) keep the order lead time constant. The observed difference in vice purchases thus appears attributable to the shopping channel in which purchases take place.

4. STUDY 3

With Study 3 we seek to determine why purchasing groceries online leads consumers to select relatively fewer vices. As we predict in H_2 , the observed difference in the relative purchase of vices online versus offline may be ascribed to their symbolic versus physical presentation. To test this hypothesis, we disentangle the effect of shopping channels and products' presentation modes. If the differential presentation modes that appear online and offline drive the observed effects in Studies 1 and 2, we should find no differences between online and offline shopping channels when the product presentation mode remains constant.

We also control for the payment mode in Study 3. Participants did not actually have to pay for their groceries in Study 2, but they may have held different assumptions about whether they would hypothetically have paid with a credit card online versus with cash offline. Because varying perceptions of pain of payment associated with different payment methods (e.g., credit cards diminish pain of payment) might have divergent effects on consumers' proneness to select and purchase vices (Bagchi and Block 2011; Thomas, Desai, and Seenivasan 2011), we explicitly address this potential confound in Study 3.

4.1 Method

4.1.1 *Participants and design.*

One hundred sixty-five students from a large Western European university (86 men; $M_{\text{age}} = 20.52$ years, $SD = 1.43$) were invited to a lab to participate in a 50-minute experimental session, in return for partial course credit. The study used a 2 (shopping channel: online vs. offline) by 2 (product presentation mode: symbolic vs. physical) between-subjects design (see Web Appendix C). Two of the conditions replicate two conditions of Study 2: Online purchases of symbolically presented products mimic an online store (online no categorization condition in Study 2), and offline purchases of physically presented products align with a traditional, offline, brick-and-mortar store (traditional offline condition in Study 2). We employed the online no categorization condition, in which participants' exposure to the products was similar to that in the offline store, rather than the traditional online condition, to avoid any potential confounds due to product exposure.

The two other conditions (i.e., online physical and offline symbolic) are not common in practice, yet they help us disentangle the influences of presentation modes and shopping channels. In the online condition with physically presented products, participants first browsed the experimental, offline grocery store, before ordering from the web store, with the physical products still in sight. The offline condition that presented products symbolically resembled the regular offline condition, except that life-sized pictures of the grocery products appeared on the shelves, instead of actual products.

4.1.2 *Procedure.*

When they arrived at the lab, all participants first read the scenario from Study 2. In addition, the instructions indicated that participants had to pay for the groceries with a credit card, which they would find on the right-hand side of their computer screen. We assigned the participants randomly to one of the four conditions, so some of them remained seated to complete the shopping task online, whereas others moved to the experimental lab store in the next room. We used the same set of grocery food products as in Study 2. As we noted previously, to keep the exposure to the grocery products as similar as possible across all four conditions, the online store displayed the pictures of the offline retail shelves instead of product categories.

Out of concern that the shopping task might have seemed odd to participants, especially for the atypical grocery store conditions (i.e., online physical and offline symbolic), we asked them to indicate whether the shopping task was realistic, and if they had purchased groceries as they normally would, and whether the products were representative for what they would normally buy. These items were measured on seven-point Likert scales (1 = “Completely disagree,” 7 = “Completely agree”). For the two online conditions, a timer embedded in the survey measured the time participants spent in the online store, while for the offline conditions, a researcher recorded how long each participant spent in the lab store. Finally, all participants reported their age and gender.

4.2 Results

We first confirmed that the available product assortment represented products the participants normally consider buying ($M = 5.60$, $SD = 1.02$). Next, we checked whether participants’ perceptions of the store, shopping experience, and the time³ they spent shopping were comparable across conditions (see Table 3). To this end, we ran three two-way ANOVAs, with shopping channel and products’ presentation mode as the independent variables and with participants’ perception of the store, the shopping experience and the time they spent shopping as the respective dependent variables. The results indicate that there were no main effects of shopping channel or presentation mode nor were there any interaction effects (see Web Appendix C), indicating that participants’ store and shopping experience perceptions and the time they spent shopping were comparable across shopping channels (i.e., online vs. offline) and presentation modes (i.e., symbolic vs. physical).

³ For 14 participants in the online conditions, the survey software did not record their time spent on the webpage accurately.

Table 3. Mean Store and Shopping Experience Perceptions, and Shopping Time (Study 3)

		Store	Shopping Experience	Shopping Time
M _{Online} (SD)	Symbolic	5.63 (.90)	5.73 (1.15)	638.37 (161.43)
M _{Online} (SD)	Physical	5.56 (1.14)	5.51 (1.28)	579.02 (226.99)
M _{Offline} (SD)	Symbolic	5.27 (1.27)	5.29 (1.38)	637.77 (185.84)
M _{Offline} (SD)	Physical	5.59 (.87)	5.63 (1.50)	680.27 (228.35)

Next, we again calculated two indices for each shopping basket: the average vice index for the items in a shopping basket and the weighted-average vice index that also takes the monetary value of the vices within each basket into account. As in Study 2, these indices correlated highly ($r = .82$).

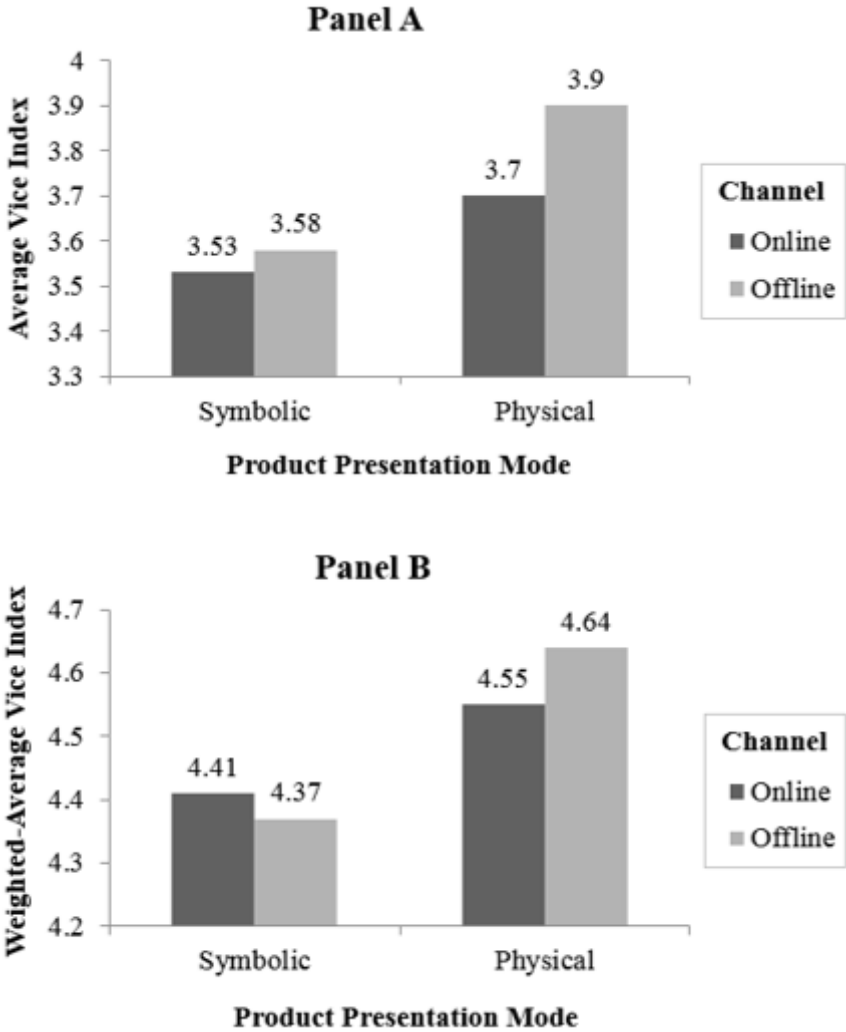
To disentangle the impact of shopping channel and grocery product presentation mode on the purchase of vices, and thus test H_2 , we ran two two-way ANOVAs, with shopping channel and product presentation mode as between-subjects factors and with respectively the simple-average and weighted-average vice indices as the dependent variables.

In line with our expectations, we no longer observed a main effect of the shopping channel ($\text{Index}_{\text{Simple-average}}$: $F(1, 161) = 1.77, p = .19$ and $\text{Index}_{\text{Weighted-average}}$: $F(1, 161) = .11, p = .74$), nor were the interaction effects significant ($\text{Index}_{\text{Simple-average}}$: $F(1, 161) = .65, p = .42$ and $\text{Index}_{\text{Weighted-average}}$: $F(1, 161) = .68, p = .41$). Only products' presentation mode significantly influenced participants' vice purchases ($\text{Index}_{\text{Simple-average}}$: $F(1, 161) = 6.94, p < .01$ and $\text{Index}_{\text{Weighted-average}}$: $F(1, 161) = 6.57, p = .01$). As illustrated in Figure 1, participants purchased relatively fewer vices when the products were symbolically rather than physically presented ($\text{Index}_{\text{Simple-average}}$: $M_{\text{Symbolic}} = 3.56, SD = .55$ vs. $M_{\text{Physical}} = 3.80, SD = .63$, see Panel A and $\text{Index}_{\text{Weighted-average}}$: $M_{\text{Symbolic}} = 4.38, SD = .54$ vs. $M_{\text{Physical}} = 4.59, SD = .49$, see Panel B). Vice purchases dropped to the level of the online symbolic condition when the products were only symbolically present when participants shopped for groceries offline ($\text{Index}_{\text{Simple-average}}$: $M_{\text{Online Symbolic}} = 3.53, SD = .50$; $M_{\text{Offline Symbolic}} = 3.58, SD = .59$; $F(1, 161) = .14, p = .71$ and $\text{Index}_{\text{Weighted-average}}$: $M_{\text{Online Symbolic}} = 4.41, SD = .51$; $M_{\text{Offline Symbolic}} = 4.37, SD = .57$;

$F(1, 161) = .12, p = .73$) and increased to the level of the offline physical condition when the grocery products were physically present when participants ordered groceries online (Index_{Simple-average}: $M_{\text{Online Physical}} = 3.70, SD = .58$; $M_{\text{Offline Physical}} = 3.90, SD = .67$; $F(1, 161) = 2.22, p = .14$ and Index_{Weighted-average}: $M_{\text{Online Physical}} = 4.55, SD = .53$; $M_{\text{Offline Physical}} = 4.64, SD = .44$; $F(1, 161) = .65, p = .42$). Put differently, online versus offline shopping did not lead to purchase differences when the products were presented symbolically or physically thus indicating that the symbolic (vs. physical) product presentation led participants to select fewer vices.

Note, however, that these results replicate the findings of Study 1 and 2 as planned contrasts comparing the online symbolic and the offline physical shopping condition indicate that both indices are significantly lower in the former than in the latter condition (Index_{Simple-average}: $M_{\text{Online Symbolic}} = 3.53$ vs. $M_{\text{Offline Physical}} = 3.90$; $F(1, 161) = 7.74, p < .01$ and Index_{Weighted-average}: $M_{\text{Online Symbolic}} = 4.41$ vs. $M_{\text{Offline Physical}} = 4.64$; $F(1, 161) = 4.13, p = .04$). These results thus confirm H_1 and add to this finding by clarifying that the difference in vice purchases is driven by the difference in presentation mode (symbolic vs. physical), rather than by the act of shopping online or offline an sich (confirming H_2).

Figure 1. Influences of Product Presentation Mode (Symbolic vs. Physical) on Online and Offline Vice Purchases (Study 3)



4.3 Discussion

In addition to replicating the findings of Studies 1 and 2, and thereby providing more empirical support for H₁, Study 3 identifies grocery products’ presentation mode as the primary driver of this shopping channel effect. The proportion of vices in participants’ shopping baskets was equally low in a traditional online shopping environment and an offline environment that presented grocery products only symbolically; it was also equally high in a traditional offline shopping environment and an online environment in which products were physically presented. Moreover, this study rules out the possibility that different perceptions of pain of payment in online versus offline channels accounted for this shopping channel

effect, because the payment mode (i.e., credit card) was identical across all conditions, yet the effect still arose.

5. STUDY 4

With Study 4, we seek to provide more profound insight into the underlying mechanism—that is, into how grocery products’ differential presentation modes in online versus offline stores affect vice purchases. We thereby test H₃, in which we argue that consumers purchase relatively fewer vices online than offline, because symbolic (as opposed to physical) product presentations decrease the products’ vividness, which lowers consumers’ proneness to seek instant gratification by purchasing vices. Furthermore, Study 2 and 3 focus on inconsequential grocery shopping decisions, whereas this study encompasses real choice behavior. The hypothetical choices in Study 2 and 3 likely excluded any effect of order lead time, but with Study 4, we address this potential confound explicitly. By testing real choice behavior, we can control for differences in order lead time and unequivocally rule out this alternative explanation for our findings.

5.1 Method

5.1.1 *Participants and design.*

One hundred twenty-five students (50 men; $M_{\text{age}} = 22.30$ years, $SD = 4.40$) were invited to the lab, to participate in a 50-minute experimental session in return for a small monetary compensation. We employed a between-subjects design with 2 conditions (channel: online vs. offline).

5.1.2 *Procedure.*

Participants entered the lab and were seated in front of a computer. They read that they were participating in a study on snacks in vending machines, because the university was considering reorganizing the available assortment. They were told that they would encounter an assortment of snacks, from which they were to choose one. The instructions also indicated that they would receive their chosen snack at the end of the experimental session, as

additional compensation for their participation. We then randomly assigned all participants to either the online or offline condition.

Participants in the offline condition (i.e., physical product presentation) received instructions to move to the room next door, where 12 snacks appeared on a small retail shelf (we describe the choice set in more detail subsequently), along with the following instructions:

“Please look at the assortment of snacks carefully and write down your choice on one of the provided forms. Return to the lab and hand over the form to the researcher in charge.

You will receive your chosen snack at the end of the experimental session.”

The participants assigned to the online condition instead remained seated in front of the computer and encountered the same snacks online (i.e., symbolic product presentation), along with similar instructions, though these participants indicated their choice by checking a circle below the picture of their preferred snack (see Web Appendix D). After expressing their choices, participants completed a questionnaire that included items to measure product vividness, namely, Shiv and Fedorikhin’s (1999) three-item, seven-point differential scale (e.g., “When I made my choice, I found it: Not easy–Easy to visualize myself consuming the snack”; Cronbach’s $\alpha = .93$), on which higher values indicated the products were more vivid. They also indicated the extent to which the items in Shiv and Fedorikhin’s (2002) instant gratification–seeking scale applied to them while they made their choice (e.g., 1 = “Keeping my impulses in check,” 7 = “Satisfying my impulses”; Cronbach’s $\alpha = .84$), so higher scores indicated they sought more instant gratification (both these scales can also be consulted in Web Appendix D). Finally, participants provided their age and gender and received their chosen snack.

5.1.3 *Choice set.*

We sought to select 12 snacks that would be perceived as either (extreme) vices or (extreme) virtues, while maintaining similar overall attractiveness and convenience scores. To this end, we pretested 24 snacks: 4 different snacks from each of three typical vice (candy bars, candy, chips) and three typical virtue (granola bars, cereal biscuits, and fruit) snack categories. On the basis of ratings provided by 105 students (39 men; $M_{\text{age}} = 22.33$ years, $SD = 2.03$), from the same university population that participated in Study 4, we selected two of the four snacks within each category (see Web Appendix D). Using the same survey that preceded Study 2, we asked each of these respondents, for a random subset of 12 snacks, the

extent to which they considered them vices (1 = “true vice,” 7 = “true virtue”). They also evaluated the snacks’ attractiveness (e.g., “This snack is appealing”) and convenience (e.g., “It is very easy and convenient to consume this snack,” adapted from Chandon and Wansink 2002) on seven-point Likert scales (1 = “Strongly disagree,” 7 = “Strongly agree”). All snacks thus were rated at least 35 times. As in Study 2, we averaged and reversed respondents’ responses to obtain a vice rating for each snack. Beside, we calculated each snack’s perceived attractiveness and convenience. We then selected 12 equally convenient snacks ($F(11, 466) = 1.29, p = .23$; $M_{\text{Convenience}} = 6.26, SD = .85$), six of which were perceived as true vices ($M_{\text{Vice Rating}} = 6.27, SD = 1.16$) and six that were considered more virtuous ($M_{\text{Vice Rating}} = 2.75, SD = 1.56$; $F(1,476) = 787.37, p < .001$). Notably, in this choice set, the vice and virtue snacks were perceived as equally attractive ($F(1,476) = 1.60, p = .21$; $M_{\text{Vice Snacks}} = 4.91, SD = 1.68$; $M_{\text{Virtue Snacks}} = 5.09, SD = 1.50$).

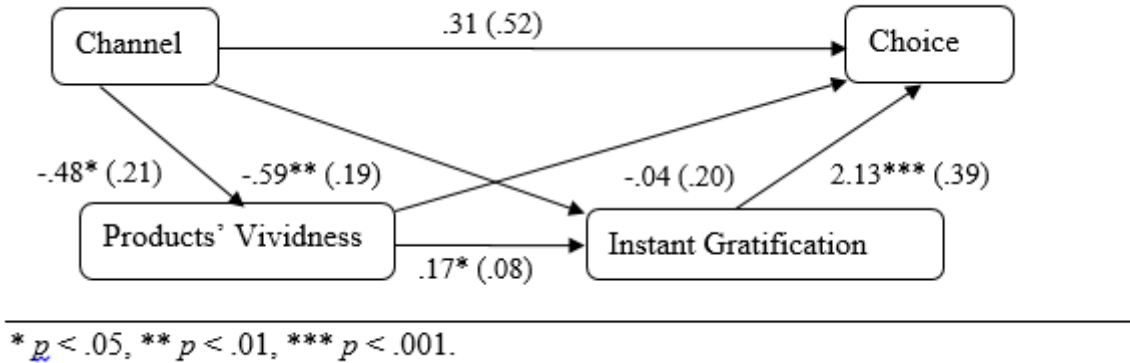
5.2 Results

Participants who encountered the choice set online, with snacks that were symbolically present, were less inclined to choose a vice than were those who encountered the choice set offline, where the products were physically present ($\chi^2(1) = 4.06, p = .04$). Only 48.30% of participants in the online condition chose a vice; this percentage reached 66.20% in the offline condition.

To test for the underlying process (H_3), we conducted a serial mediation analysis with channel (0 = offline, 1 = online) as the independent variable and choice (0 = virtue, 1 = vice) as the dependent variable; the products’ vividness and instant gratification served as mediators. We used bias-corrected bootstrapping with 10,000 bootstrap samples to generate a 95% confidence interval (CI) around the indirect effects of these mediators and the indirect effect through both mediators in serial order, where mediation occurs if the CI excludes zero (Hayes 2009, 2013). The bootstrapping results supported our conceptual serial mediation model. The serial indirect effect was significant ($ab = -.17, \text{standard error [SE]} = .12; 95\% \text{ CI} = [-.49, -.01]$). In line with our expectations, the online, symbolic product presentation (cf. offline, physical product presentation) decreased products’ vividness, which rendered consumers less prone to seek instant gratification by choosing vices (Figure 2), in support of H_3 . The analysis revealed a significant indirect effect for instant gratification ($ab = -1.25, SE = .49; 95\% \text{ CI} = [-2.25, -.43]$) but not for products’ vividness ($ab = .02, SE = .12; 95\% \text{ CI} =$

[-.20, .30]), meaning that the effect of shopping channel on instant gratification is not solely mediated by products' vividness.

Figure 2. Serial Mediation Model (Study 4)



5.3 Discussion

Study 4 replicates the findings of Studies 1–3, with real choices in a controlled laboratory environment, and it provides evidence for the serial mediation account proposed in H₃. The differential presentation mode for products in online versus offline channels (i.e., symbolic vs. physical) affects those products' vividness, which in turn affects consumers' focus on instant gratification. Symbolic product presentations online (vs. physical product presentations offline) decrease products' vividness, which diminishes consumers' desire for immediately gratifying products (i.e., vices). These findings align with prior research on products' presentation mode (Shiv and Fedorikhin 1999, 2002) and extend this literature stream, by replicating the effect in a non-binary choice task. Furthermore, we unequivocally rule out order lead time as an alternative account for our findings, because the time before the product became available to the participants was identical in both the online and offline conditions (i.e., at the end of the experimental session).

6. GENERAL DISCUSSION

The results obtained from a series of four studies—in diverse settings, with different consumer groups, and encompassing a wide variety of vice products—provide consistent evidence for our proposition that consumers are likely to buy fewer vices in an online than in an offline shopping environment (H₁). Our studies underscore that the symbolic product

presentation in online environments, compared with the physical product presentation in offline environments, is a key driver of this effect (H₂). Because the symbolic presentation decreases products' vividness, the desire for immediately gratifying products diminishes, which leads consumers to buy relatively fewer vices in an online compared with an offline shopping environment (H₃).

Although all four studies provide strong support for our main proposition, each study also makes a unique contribution. Study 1 relies on actual shopping data, collected from customers who frequent both online and offline stores run by a large retailer. Thus, the same customers purchase fewer vices when they buy groceries online, as evidenced by actual sales data related to five vice categories. Study 2 includes food items only, encompasses a broader array of vice categories, and accounts for the extent to which consumers believe that different grocery products are vices. Moreover, this study rules out differential exposure to grocery products in online and offline shopping environments as an alternative account for our findings and controls for both consumers' shopping motives and the presence of store atmospherics. Study 3 pinpoints the grocery product presentation mode (symbolic vs. physical) as the determinant of the shopping channel effect, while controlling for the potential effects of different payment methods. Finally, Study 4 tests real choice behavior in a controlled laboratory environment and provides more profound evidence of how product presentation modes in online versus offline channels (symbolic vs. physical) affect consumers' desire for immediately gratifying products, according to the products' vividness. This study also unambiguously rules out differences in order lead time as an alternative explanation for the observed differences in vice purchases across online and offline shopping channels.

6.1 Theoretical Contributions

This manuscript contributes to marketing theory in several ways. First, previous research on online and offline shopping environments mainly focuses on different risk perceptions (Bart et al. 2005), the varying importance of search attributes such as brand names or prices (Degeratu, Rangaswamy, and Wu 2000), differences in the profitability of price promotions (Zhang and Wedel 2009), order lead time (Milkman, Rogers, and Bazerman 2010), or cross-channel cannibalization and synergy effects (Avery et al. 2012; Geyskens, Gielens, and Dekimpe 2002). We contribute by identifying symbolic versus physical product presentation as a key difference between online and offline shopping environments, with

substantial implications for the purchase of vices. Prior research indicates that consumers buy less vices the further ahead they plan their purchases (Milkman, Rogers, and Bazerman 2010), but this finding might be growing less relevant, considering online retailers' ongoing efforts to decrease order lead times. Our findings clarify that it is not just timing, but also the product presentation mode, that reduces vice purchases online.

We also acknowledge that online and offline shopping environments diverge in the extent to which physical movements might trigger consumers' approach motivations and thus spur the selection of vices (Van den Bergh, Schmitt, and Warlop 2011). In an online shopping environment, consumers click buttons to add items to their virtual shopping carts, whereas offline the approach-related action of grasping grocery items from a shelf likely invokes an approach motivation. This explanation is interesting, yet our Study 3 results do not support it. Had the act of grasping a product been the driving mechanism, we should have found no difference in the proportion of vices purchased between the offline physical and offline symbolic product presentation conditions, because both involved a similar grasping movement (i.e., grasping a life-sized product picture or a real, physical product). Instead, we observed that the participants in our study selected fewer vices when they encountered pictures, rather than the actual products, on shelves.

Second, by comparing online and offline shopping contexts, which present products in symbolic and physical manners, respectively, we add to sensory distance literature (Hoch and Loewenstein 1991; Loewenstein 1996; Mischel and Ebbesen 1970; Shiv and Fedorikhin 1999, 2002). Extant research focuses almost exclusively on the impact of exposures to *unpacked* food products on people's desire for gratification. But in offline stores, most food products are packaged, so in our studies, even the condition with the smallest sensory distance featured products with greater sensory distance than existed in prior research. Extant comparisons of products characterized by high sensory distance (i.e., opaquely packaged products or pictures) with products characterized by no sensory distance (i.e., unpackaged products) reveal steep increases in the desire for gratification. With our investigation, we show that smaller differences in sensory distance (i.e., pictures versus opaquely packaged goods) also can affect consumers' desire for gratification.

Third, our research complements Shiv and Fedorikhin's (1999, 2002) studies, in which they assess the impact of presentation format when consumers make binary food choices by trading off vices and virtues. Our findings suggest that symbolic presentations also decrease the choice of vices in a grocery shopping environment, even when consumers are not forced to compare the benefits and downsides of vices and virtues directly.

Fourth, we add to extant literature regarding the influence of product presentation on choices of vice products (e.g., Fishbach and Zhang 2008; Sela, Berger, and Liu 2009; van Kleef, Otten, and van Trijp 2012). Rather than focusing on the impact of product presentation in a single channel, we reveal that the selected shopping channel may affect vice purchases, due to differences in product presentations across channels. With this insight, we also respond to calls for more research and a better understanding of how supermarkets can encourage healthy purchase patterns (Glanz, Bader, and Iyer 2012). Moreover, our results suggest that scholars studying drivers of vice purchases should not rely exclusively on symbolic product representations (as is common in lab studies) when making intervention recommendations.

6.2 Consumer, Public Policy, and Managerial Implications

Being obese or overweight has an adverse impact on people's quality of life, as well as significant sociological (Brownell et al. 2005; Christakis and Fowler 2009), psychological (Falkner et al. 2001; Puhl and Heuer 2010), and economic (Finkelstein et al. 2009) costs. Despite public policy campaigns promoting healthy pursuits and popular media that nearly constantly confront consumers with advice about their food decisions and diet consciousness, evidence shows that many consumers pursue health goals but fail to achieve them. Approximately 75% of U.S. women and 47% of U.S. men have dieted at some point during their lifetimes (Jeffery, Adlis, and Forster 1991), yet many of them struggle to maintain a healthy weight (Baumeister and Tierney 2011). Our findings suggest that simply changing the shopping channel used to buy groceries might aid consumers to decrease their purchases of unhealthy food products. Therefore, we would recommend public policy makers to encourage consumers to shop online as well as to facilitate online shopping. For example by stimulating the use of free applications to order groceries (e.g., through smartphones) and by providing low-priced Internet access, even some of the most vulnerable consumers might be nudged toward online grocery shopping—as in developed nations obesity is more widespread among poorer populations (Boumtje et al. 2005; Miech et al. 2006) which is also the segment of consumers amongst whom Internet penetration rates are particularly low (Chen and Wellman 2004).

Our findings are also valuable for retailers, as they have vested interests in knowing how – and why – their customers' shopping baskets might differ in their online and offline outlets. Nudging consumers toward online grocery shopping also represent a golden opportunity for retailers to bolster their brand image and counteract the criticisms that large

retail chains contribute to obesity rates – such as the argument that the massive growth of Walmart Supercenters would explain 10.5% of the rise in obesity since the late 1980s (Courtemanche and Carden’s 2011). By raising consumers’ awareness of online shopping, minimizing order lead times (e.g., facilitating pickup and delivery), and overcoming risk perceptions (e.g., convincing customers of the quality of fresh produce ordered online), retailers might persuade and stimulate consumers to frequent their online stores whilst nudging them to adopt more healthy purchase patterns. In addition, retailers might consider to extend their online services beyond web-based stores or mobile applications. For example, by plastering the walls of stations with product pictures and providing quick response codes for each product, Tesco allows consumers in South Korea to fill virtual shopping baskets, using smartphones, while they wait for the next train.

Finally, our findings might be relevant to market researchers as well, as they often gauge consumers’ attitudes via surveys, thus relying on symbolic presentations (i.e., pictures) which are less vivid as sensory distance is high. Our results suggest that for example consumers’ product attitudes might be slightly different when acquired whilst physically encountering real products.

6.3 Limitations and Further Research

This study has several limitations that suggest avenues for further research. First, our database study contains information about customers’ grocery purchases over four months from a single retailer. If after shopping online, consumers regret their lack of vices, they might complement their grocery purchases with convenience purchases afterwards and shop for vices elsewhere. Similarly, our lab studies used data gathered from a single, hypothetical shopping trip. As such, we could assess only the extent to which online and offline shoppers made distinct choices at one specific moment in time. As online shoppers might complement their stock of vices later on, we cannot state with confidence that online consumers ultimately consume fewer vices. Additional research should consider the long-term effects, including whether the decrease in vice purchases persists after consumers have fully adopted the online channel and become used to online shopping.

Second, the retailer in Study 1 may differ from other retailers. It requires online customers to pick up their groceries and pay in stores, using cash or a debit card. Therefore, our conclusions can be generalized to other shopping situations only with caution. Online customers who must pick up their groceries may be less inclined to buy products in bulk.

Moreover, when shoppers can pay by credit card—with the reasonable assumption that online shoppers tend to do so—their vice purchases might differ, because credit cards diminish pain of payment (Bagchi and Block 2011; Thomas, Desai, and Seenivasan 2011).

Third, naïve theories have demonstrated that consumers often hold erroneous beliefs about the healthiness of a product (Schwarz 2004). For example, some consumers believe that GMO's are unhealthy (Shaw 2002) or that organic products are healthier than non-organic products (Magnusson et al. 2003). Such erroneous beliefs lead to suboptimal choices both online and offline. As, we rely in our experimental studies on participants' perceptions of the products, our DVs likely also have taken into account such incorrect perceptions.

Fourth, risk perceptions (e.g., online payment fraud), and adoption rates of online shopping, as well as obesity rates and the relative prices of vices and virtues, all vary across countries. As we conducted all four studies in a single European country further research might seek to investigate to what extent the impact of shopping channels on the purchase of vices differs in other countries. However, the impact of symbolic versus physical presentation was originally demonstrated in a U.S. context (Loewenstein 1996; Shiv and Fedorikhin 1999, 2002), so we predict that our findings likely hold elsewhere as well.

Finally, it would be interesting to assess the implications of recent evolutions in online retailing that provide more sensory experiences and rely more on mobile interfaces. Recent technology advances enable virtual interactions with three-dimensional depictions of products, which may create an environment that resembles an offline setting and simulates a sense of “being there” (Dobrowolski et al. 2014; Li, Daugherty and Biocca 2001, 2002). Such technological improvements may decrease the sensory distance associated with online shopping, though the online shopping experience still is not comparable to traditional forms, because it is inherently indirect and interface mediated (Heeter 2000). Furthermore, technological advances generally seek to increase the speed and ease of online shopping (Porter and Donthu 2006) and spur its growth (Goettler and Clay 2011), rather than increasing consumers' olfactory and haptic experiences. The second evolution pertains to how mouse-driven desktop computers are giving way to touchpad laptops or touchscreen tablets. Brasel and Gips (2014) argue that research into online consumer behavior must start accounting for the different interfaces consumers use to access content, because the interfaces determine their experience. The mode of presentation on websites and mobile applications is consistently symbolic, yet using a touchscreen device requires consumers to interact more with the displayed product, whereas this touch dimension is absent from a desktop computer interface.

It would be worthwhile to determine if using a touchscreen decreases sensory distance, relative to the use of a mouse-driven desktop.

This study sheds light on how online versus offline grocery shopping affects vice purchases. Consumers are likely to purchase fewer vices online than offline, because the symbolic presentation of products decreases the products' vividness and diminishes consumers' striving for immediate gratification. Considering that many consumers struggle to limit their purchase of vices, these findings are highly relevant and provide them with a simple tool to potentially gain more control over their own buying behavior.

7. REFERENCES

- ACNielsen (2012, August), "How Digital Influences How We Shop Around the World," fi.nielsen.com. Retrieved May 6, 2014 from <http://fi.nielsen.com/site/documents/NielsenGlobalDigitalShoppingReportAugust2012.pdf>
- Alba, Joseph, John Lynch, Barton Weitz, Chris Janiszewski, Richard Lutz, Alan Sawyer, and Stacey Wood (1997), "Interactive Home Shopping: Consumer, Retailer, and Manufacturer Incentives to Participate in Electronic Marketplaces," *Journal of Marketing*, 61 (July), 38–53.
- Avery, Jill, Thomas J. Steenburgh, John Deighton, and Mary Caravella (2012), "Adding Bricks to Clicks: Predicting the Patterns of Cross-Channel Elasticities over Time," *Journal of Marketing*, 76 (3), 96–111.
- Bagchi, Rajesh and Lauren G. Block (2011), "Chocolate Cake Please! Why Do Consumers Indulge More When It Feels More Expensive?" *Journal of Public Policy & Marketing*, 30 (2), 294-306.
- Bart, Yakov, Venkatesh Shankar, Fareena Sultan, and Glen L. Urban, (2005), "Are the Drivers and Role of Online Trust the Same for All Web Sites and Consumers? A Large-Scale Exploratory Empirical Study," *Journal of Marketing*, 69 (4), 133–152.
- Baumeister, Roy F. and John Tierney (2011), *Willpower: Rediscovering the Greatest Human Strength*. Penguin.
- Bossert-Zaudig, S., R. Laessle, C. Meiller, H. Ellring, and K.M. Pirke (1991), "Hunger and Appetite during Visual Perception of Food in Eating Disorders," *European Psychiatry*, 6 (5), 237–42.
- Boumtje, Pierre I., Chuang L. Huang, Jonq-Ying Lee, and Biing Hwan Lin (2005), "Dietary Habits, Demographics, and the Development of Overweight and Obesity Among Children in the United States," *Food Policy*, 30 (2), 115–128.
- Brasel, Adam S. and James Gips (2014), "Tablets, Touchscreens, and Touchpads: How Varying Touch Interfaces Trigger Psychological Ownership and Endowment," *Journal of Consumer Psychology*, 24 (2), 226–233.
- Brownell, Kelly D., Rebecca M. Puhl, Marlene B. Schwartz, and Leslie Rudd (2005), *Weight Bias: Nature, Consequences, and Remedies*. New York: Guilford Press.
- Bryk, Anthony S. and Stephen W. Raudenbush (1992), *Hierarchical Linear Models: Applications and Data Analysis Methods*. Newbury Park, CA: Sage.

- Chandon, Pierre and Brian Wansink (2002), "When Are Stockpiled Products Consumed Faster? A Convenience-Salience Framework of Postpurchase Consumption Incidence and Quantity," *Journal of Marketing Research*, 39 (3), 321–335.
- Chen, Wenhong and Barry Wellman (2004), "The Global Digital Divide—Within and Between Countries," *IT & Society*, 1 (7), 39–45.
- Cho, Chang-Hoan, Jaewon Kang, and Hongsik John Cheon (2006), "Online Shopping Hesitation," *CyberPsychology & Behavior*, 9 (3), 261–274.
- Christakis, Nicholas A. and James H. Fowler (2009), "The Spread of Obesity in a Large Social Network Over 32 Years," *New England Journal of Medicine*, 357 (3), 370–379.
- Chu, Junhong, Marta Arce-Urrizba, José-Javier Cebollada-Calvo, and Pradeep K. Chintagunta (2010), "An Empirical Analysis of Shopping Behavior Across Online and Offline Channels for Grocery Products: The Moderating Effects of Household and Product Characteristics," *Journal of Interactive Marketing*, 24 (4), 251–268.
- , Pradeep K. Chintagunta, and Javier Cebollada (2008), "A Comparison of Within-Household Price Sensitivity Across Online and Offline Channels," *Marketing Science*, 27 (2), 283–299.
- Courtemanche, Charles and Art Carden (2011), "Supersizing Supercenters? The Impact of Walmart Supercenters on Body Mass Index and Obesity," *Journal of Urban Economics*, 69 (2), 165–181.
- Danaher, Peter J., Isaac W. Wilson, and Robert A. Davis (2003), "A Comparison of Online and Offline Consumer Brand Loyalty," *Marketing Science*, 22 (4), 461–476.
- Degeratu, Alexander M., Arvind Rangaswamy, and Jianan Wu (2000), "Consumer Choice Behavior in Online and Traditional Supermarkets: The Effects of Brand Name, Price, and Other Search Attributes," *International Journal of Research in Marketing*, 17 (1), 55–78.
- Deng, Xiaoyan and Raji Srinivasan (2013), "When Do Transparent Packages Increase (or Decrease) Food Consumption?" *Journal of Marketing*, 77 (4), 104–117.
- Dhar, Ravi and Klaus Wertenbroch (2000), "Consumer Choice Between Hedonic and Utilitarian Goods," *Journal of Marketing Research*, 37 (February), 60–71.
- Dobrowolski, Pawel, Grzegorz Pochwatko, Maciek Skorko, and Maksymilian Bielecki (2014), "The Effects of Virtual Experience on Attitudes Toward Real Brands," *Cyberpsychology Behavior and Social Networking*, 17 (2), 125–128.

- Dubé, Laurette, Antoine Bechara, Alain Dagher, Adam Drewnowski, Jordan LeBel, Philip James, and Yada Rickey (2010), *Obesity Prevention: The Role of Brain and Society on Individual Behavior*. San Diego, CA: Academic Press.
- Falkner, Nicole H., Dianne Neumark-Sztainer, Mary Story, Robert W. Jeffery, Trish Beuhring, and Michael D. Resnick (2001), "Social, Educational, and Psychological Correlates of Weight Status in Adolescents," *Obesity Research*, 9 (1), 32–42.
- Finkelstein, Eric A., Justin G. Trogon, Joel W. Cohen, and William Dietz (2009), "Annual Medical Spending Attributable to Obesity: Payer- and Service-Specific Estimates," *Health Affairs*, 28 (5), 822–831.
- Fishbach, Ayelet and Ying Zhang (2008), "Together or Apart: When Goals and Temptations Complement Versus Compete," *Journal of Personality and Social Psychology*, 94 (4), 547–559.
- Geyskens, Inge, Katrijn Gielens, and Marnik G. Dekimpe (2002), "The Market Valuation of Internet Channel Additions," *Journal of Marketing*, 66 (2), 102–119.
- Glanz, Karen, Michael D.M. Bader, and Shally Iyer (2012), "Retail Grocery Store Marketing Strategies and Obesity: An Integrative Review," *American Journal of Preventive Medicine*, 42 (5), 503–512.
- Goettler, Roland L. and Karen Clay (2011), "Tariff Choice with Consumer Learning and Switching Costs," *Journal of Marketing Research*, 48 (4), 633–652.
- Hayes, Andrew F. (2009). "Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium," *Communication Monographs*, 76 (4), 408–420.
- (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis*, New York: Guilford Press.
- Heeter, Carrie (2000), "Interactivity in the Context of Designed Experiences," *Journal of Interactive Advertising*, 1 (1). Retrieved May 14, 2014, from <http://jiad.org/article2.html>
- Hill, Andrew J., Lynn D. Magson, and John E. Blundell (1984), "Hunger and Palatability: Tracking Ratings of Subjective Experience Before, During and After the Consumption of Preferred and Less Preferred Food," *Appetite*, 5 (4), 361–371.
- Hoch, Stephen J. and George F. Loewenstein (1991), "Time-Inconsistent Preferences and Consumer Self-Control," *Journal of Consumer Research*, 17 (4), 492–507.
- Huang, Peng, Nicholas H. Lurie, and Sabyasachi Mitra (2009), "Searching for Experience on the Web: An Empirical Examination of Consumer Behavior for Search and Experience Goods," *Journal of Marketing*, 73 (2), 55–69.

- Hui, Sam K., Eric T. Bradlow, and Peter S. Fader (2009), "Testing Behavioral Hypotheses Using an Integrated Model of Grocery Store Shopping Path and Purchase Behavior," *Journal of Consumer Research*, 36 (3), 478–493.
- Jeffery, Robert W., Susan A. Adlis, and Jean L. Forster (1991), "Prevalence of Dieting Among Working Men and Women: The Healthy Worker Project," *Health Psychology*, 10 (4), 274–281.
- Kardes, Frank R., Maria L. Cronley, and John Kim (2006), "Construal-Level Effects on Preference Stability, Preference-Behavior Correspondence, and the Suppression of Competing Brands," *Journal of Consumer Psychology*, 16 (2), 135–144.
- Kessler, David A. (2009), *The End of Overeating: Taking Control of the Insatiable American Appetite*. Emmaus, PA: Rodale.
- Khan, Uzma and Ravi Dhar (2007), "Where There Is a Way, Is There a Will? The Effect of Future Choices on Self-Control," *Journal of Experimental Psychology*, 136 (2), 277–288.
- Li, Hairong, Terry M. Daugherty, and Frank Biocca (2001), "Feeling the Presence of Products: Consumer Learning from Virtual Experience," paper presented at the American Marketing Association Winter Educators' Conference, February 16–19, Scottsdale, AZ.
- , ———, and ——— (2002), "Impact of 3-D Advertising on Product Knowledge, Brand Attitude, and Purchase Intention: The Mediating Role of Presence," *Journal of Advertising*, 31 (3), 43–57.
- Loewenstein, George F. (1996), "Out of Control: Visceral Influences on Behavior," *Organizational Behavior and Human Decision Processes*, 65, 272–292.
- Magnusson, Maria K., Anne Arvola, Ulla-Kaisa K. Hursti, Lars Aberg, and Per-Olow Sjöden (2003), "Choice of Organic Foods is Related to Perceived Consequences for Human Health and to Environmentally Friendly Behaviour," *Appetite*, 40 (2), 109–117.
- Metcalfe, Janet, and Walter Mischel (1999), "A Hot/Cool-System Analysis of Delay of Gratification: Dynamics of Willpower," *Psychological Review*, 106 (1), 3.
- Miech, Richard A., Shiriki K. Kumanyika, Nicolas Stettler, Bruce G. Link, Jo C. Phelan, and Virginia W. Chang (2006), "Trends in the Association of Poverty with Overweight Among US Adolescents, 1971-2004," *Journal of the American Medical Association*, 295 (20), 2385–2393.

- Milkman, Katherine L., Todd Rogers, and Max H. Bazerman (2010), "I'll Have the Ice Cream Soon and the Vegetables Later: A Study of Online Grocery Purchases and Order Lead Time," *Marketing Letters*, 21 (1), 17–35.
- Mischel, Walter and Ebbe B. Ebbesen (1970), "Attention in Delay of Gratification," *Journal of Personality and Social Psychology*, 16 (2), 329–337.
- Morganosky, Michelle A. and Brenda J. Cude (2002), "Consumer Demand for Online Food Retailing: Is it Really a Supply Side Issue?" *International Journal of Retail & Distribution Management*, 30 (10), 451–458.
- Nelson, Philip (1974), "Advertising as Information," *Journal of Political Economy*, 82 (4), 729–754.
- Ogden, Cynthia L., Margaret D. Carroll, Brian K. Kit, and Katherine M. Flegal (2014), "Prevalence of Childhood and Adult Obesity in the United States, 2011-2012," *Journal of the American Medical Association*, 311 (8), 806–814.
- Pollan, Michael (2006), *The Omnivore's Dilemma: A Natural History of Four Meals*. New York: Penguin Press.
- Popkin, Barry M. (2002), "An Overview on the Nutrition Transition and its Health Implications: The Bellagio Meeting," *Public Health Nutrition*, 5 (1a), 93–103.
- Porter, Constance Elise and Naveen Donthu (2006), "Using the Technology Acceptance Model to Explain How Attitudes Determine Internet Usage: The Role of Perceived Access Barriers and Demographics," *Journal of Business Research*, 59 (9), 999–1007.
- Pozzi, Andrea (2013), "E-Commerce as a Stockpiling Technology: Implications for Consumer Savings," *International Journal of Industrial Organization*, 31 (6), 677–689.
- Puhl, Rebecca M. and Chelsea A. Heuer (2010), "Obesity Stigma: Important Considerations for Public Health," *American Journal of Public Health*, 100 (6), 1019–1028.
- Rohm, Andrew J. and Vanitha Swaminathan (2004), "A Typology of Online Shoppers Based on Shopping Motivations," *Journal of Business Research*, 57 (7), 748–757.
- Schwarz, Norbert (2004), "Meta-Cognitive Experiences in Consumer Judgment and Decision Making," *Journal of Consumer Psychology*, 14 (4), 332–348.
- Sela, Aner, Jonah Berger, and Wendy Liu (2009), "Variety, Vice, and Virtue: How Assortment Size Influences Option Choice," *Journal of Consumer Research*, 35 (6), 941–951.

- Shankar, Venkatesh, Amy Smith, and Arvind Rangaswamy (2003), "Customer Satisfaction and Loyalty in Online and Offline Environments," *International Journal of Research in Marketing*, 20 (2), 153–175.
- Shaw, Alison (2002), "It Just Goes Against the Grain. Public Understandings of Genetically Modified (GM) Food in the UK," *Public Understanding of Science*, 11 (3), 273–291.
- Shiv, Baba and Alexander Fedorikhin (1999), "Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making," *Journal of Consumer Research*, 26 (December), 278–91.
- and ——— (2002), "Spontaneous versus Controlled Influences of Stimulus-Based Affect on Choice Behavior," *Organizational Behavior and Human Decision Processes*, 87 (March), 342–70.
- Snijders, Tom A. and Roel J. Bosker (1999), *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. London: Sage Publications.
- Thomas, Manoj, Kalpesh Kaushik Desai, and Satheeshkumar Seenivasan (2011), "How Credit Card Payments Increase Unhealthy Food Purchases: Visceral Regulation of Vices," *Journal of Consumer Research*, 38 (1), 126–139.
- Turley, L.W. and Ronald E. Milliman (2000), "Atmospheric Effects on Shopping Behavior: A Review of the Experimental Evidence," *Journal of Business Research*, 49 (2), 193–211.
- Van den Bergh, Bram, Julien Schmitt, and Luk Warlop (2011), "Embodied Myopia," *Journal of Marketing Research*, 48 (6), 1033–1044.
- van Kleef, Ellen, Kai Otten, and Hans C.M. van Trijp (2012), "Healthy Snacks at the Checkout Counter: a Lab and Field Study on the Impact of Shelf Arrangement and Assortment Structure on Consumer Choices," *BMC Public Health*, 12 (1), 1072.
- van Noort, Guda (2008), "Bricks versus Clicks: A Self-Regulation Perspective on Consumer Responses in Online and Conventional Shopping Environments," doctoral dissertation. Available at http://dare.uvu.vu.nl/bitstream/handle/1871/15961/2title_page.pdf?sequence=2.
- Vohs, Kathleen D., and Todd F. Heatherton (2000), "Self-Regulatory Failure: A Resource-Depletion Approach," *Psychological Science*, 11 (3), 249–254.
- Wansink, Brian and Rohit Deshpande (1994), "Out of Sight, Out of Mind: Pantry Stockpiling and Brand-Usage Frequency," *Marketing Letters*, 5 (1), 91–100.
- Wertenbroch, Klaus (1998), "Consumption Self-Control by Rationing Purchase Quantities of Virtue and Vice," *Marketing Science*, 17 (Fall), 317–37.

World Health Organization (2014), "Obesity and Overweight," www.who.int, Retrieved May 8, 2014 from <http://www.who.int/mediacentre/factsheets/fs311/en/>.

Zhang, Jie and Michel Wedel (2009), "The Effectiveness of Customized Promotions in Online and Offline Stores," *Journal of Marketing*, 46 (2), 190–206.

8. WEB APPENDIX: CLICKS AS A HEALTHY ALTERNATIVE TO BRICKS:
HOW ONLINE GROCERY SHOPPING REDUCES VICE PURCHASES

8.1 Web Appendix A. Study 1

Table A1. Single-Channel Customers' Mean Relative Vice Expenses at Different Total Spending Levels

Total Expenses	Number of Receipts	Number of Customers	M_{Online}	M_{Offline}	F	p-Value
No cut-off	891,503	166,541	.056	.111	543.53	< .001
≤ € 500	890,412	166,434	.057	.111	531.24	< .001
≤ € 400	888,506	165,930	.058	.111	523.68	< .001
≤ € 300	879,379	163,658	.058	.112	475.59	<.001
≤ € 200	826,260	152,675	.059	.115	368.71	<.001
≤ € 100	555,962	104,065	.058	.158	111.12	<.001
≤ € 50	265,249	48,460	.092	.188	17.70	<.001

Table A2. Single-Channel Customers' Mean Relative Expenses for Five Vice Categories

Product Category	M_{Online}	M_{Offline}	F	p-Value
Candy bars	.070	.133	121.26	< .001
Chocolate	.058	.112	126.33	< .001
Chips	.038	.075	131.45	< .001
Sweets and chewing gum	.062	.112	93.72	< .001
Salty snacks	.040	.083	55.78	< .001

8.2 Web Appendix B. Study 2

Condition 1: Traditional offline shopping



Condition 2: Traditional online shopping

The screenshot shows a website with a navigation bar containing several product categories: Groenten & fruit, Beenhouwerij & charcuterie, Bakkerij & banket, Gereide maaltijden, Diepvries, Zuivel & kaas, Kruideniersware, Snoep, chocolade & koeken, and Dranken. A blue oval highlights the 'Snoep, chocolade & koeken' category, with an arrow pointing to a box labeled 'Product categories'. Below the navigation bar, there is a 'Winkelwagen' section indicating the cart is empty. The main content area is titled 'Repen en Chocoladesnoepjes' and shows a list of products: 'Kinder Bueno 5 stuks...' for € 3,95 and 'Lion 6 stuks: 6x42 gram' for € 3,29. Each product has a 'Details' and 'In winkelmand' button. Below these, the tops of 'Maltesers' and 'Mars' candy bars are visible.

Condition 3: Online no categorization

The screenshot shows a website with a search bar at the top right containing the text 'Zoeken...' and a magnifying glass icon. Below the search bar, there is a 'Winkelwagen' section indicating the cart is empty. The main content area features a large blue oval highlighting two images of a store's shelves. The left image is labeled 'Producten Voorzijde winkel - Klik hier' and the right image is labeled 'Producten Achterzijde winkel - Klik hier'. An arrow points from the oval to a box labeled 'Pictures of the front and back side of the shelves in the experimental lab store'. At the bottom of the page, there are sections for 'Klantenservice' (with links for 'Sitemap' and 'Betalen met bankkaart') and 'Betaalmethoden' (with a 'Betaal met iDeal' button).

Table A3. Vice Ratings for Studies 2 and 3

Vice Ratings Above the Scale Midpoint		Rating		Vice Ratings Below the Scale Midpoint	Rating
1	Cola Bottles (candy)	8.49	61	Apple Juice	4.91
2	Sour Sweets	8.46	62	Mozzarella Cheese	4.86
3	Lollipops	8.40	63	Vegetables Soup	4.80
4	Strawberry Laces (candy)	8.34	64	Orange Juice	4.68
5	Caramel Milk Chocolate Bars (7-pack)	8.32	65	Tomato Soup	4.57
6	Bicky Flavored Chips	8.22	66	Grated Cheese	4.50
7	Maltesers Chocolate Bag/Pouch	8.17	67	Multi Fruit Juice	4.49
8	M&M's Chocolate Bag/Pouch	8.05	68	Tomato-Vegetable Soup	4.47
9	Biscuits with Chocolate	8.05	69	Yoghurt with Granola	4.47
10	Milk Chocolate Coated Sticks	8.03	70	Cheese Burgers	4.44
11	Pickled Chips	7.95	71	Canned Peaches	4.42
12	Caramel Milk Chocolate Bar (single)	7.93	72	4 Fruits Jam	4.35
13	Smoked Cheese Chips	7.92	73	Soft Cheese	4.30
14	Caramel Biscuit Milk Chocolate Bars (7-pack)	7.88	74	Yoghurt Strawberry-Raspberries	4.24
15	Mexican Pepper & Sour Cream Chips	7.87	75	Ham Sausage (sliced)	4.07
16	American Cookies	7.83	76	Tomato Sauce	4.05
17	BBQ-Paprika Flavored Nuts	7.83	77	Yoghurt Exotic Fruit	4.00
18	Milk Chocolate Bars with Nuts (pack)	7.80	78	Unsalted Block Butter	3.97
19	Chocolate Mousse (pack)	7.79	79	Steak	3.92
20	Milk Chocolate Bars with Banana Filling (pack)	7.77	80	Leerdammer Cheese	3.92
21	White Chocolate Bar with Rice Crisps	7.75	81	Apple Compote	3.87
22	Chili Flavored Nuts	7.74	82	Cooked Ham (sliced)	3.82
23	Milk Chocolate Egg	7.74	83	Rice	3.79

24	Chocolate Biscuits	7.67	84	Noodles	3.60
25	Caramel Milk Chocolate Bars with Rice Crisps (6-	7.66	85	Fusilli	3.43
26	Wine Gummies	7.66	86	Cooked Chicken (sliced)	3.42
27	Cake Vanilla-Chocolate	7.62	87	Spaghetti	3.16
28	Hazelnut Milk Chocolate Bars (pack)	7.61	88	Chicken Breast Fillet	3.05
29	Cakes with Milk Chocolate Pieces	7.44	89	Sparkling Water	3.05
30	Milk Chocolate Matinettes	7.43	90	Bananas	3.00
31	Orange Soda	7.34	91	Semi-Skimmed Milk	2.87
32	Milk Chocolate Eggs	7.33	92	Mushrooms	2.83
33	Dark Chocolate Bar	7.31	93	White Bread	2.76
34	Smarties Tube	7.25	94	Red Paprika	2.74
35	Pizza Margharita	7.23	95	Nectarines	2.42
36	Caramel Biscuit Milk Chocolate Bar (single)	7.21	96	Cucumber	2.37
37	Milk Chocolate Coated Biscuits with Vanilla Filling	7.19	97	Brown Bread	2.30
38	Lemon Soda	7.08	98	Sugar snaps	2.21
39	Salty Biscuits	7.07	99	Still Water	2.15
40	Pizza Quatro Stagionni	7.05	100	Kiwis	2.08
41	Pizza Hawaii	7.03	101	Apples	2.03
42	Canned Mini Wiener Sausages	7.00	102	Tomatoes	1.95
43	Hazelnut-Chocolate Cereals	7.00	103	Zucchini	1.92
44	Hazelnut Chocolate Spread	6.95	104	Green Paprika	1.87
45	Pudding Chocolate-Vanilla	6.95	105	Potatoes	1.85
46	Chocolate Flakes	6.89	106	Pears	1.79
47	Ice tea	6.85	107	Broccoli	1.56
48	White Chocolate Coated Cakes (pack)	6.77			
49	Hazelnut-Chocolate Pudding	6.73			

50	Honey Balls Cereals	6.67
51	Biscuit Spread	6.59
52	Lemonade	6.56
53	Dark Chocolate Coated Biscuits (pack)	6.54
54	Cola (zero-sugar)	6.31
55	Rice Pudding (pack)	6.22
56	Chocolate Milk	6.18
57	Macaroni	5.97
58	Lasagna Bolognese	5.91
59	Cooking Cream	5.32
60	Pork Sausages	5.03

8.3 Web Appendix C. Study 3

1. Offline Physical: Identical to the traditional offline shopping condition in Study 2
2. Online Symbolic: Identical to the online no categorization condition in Study 2
3. Online Physical: Participants ordered groceries online, as in the online no categorization condition, while inside the physical lab store:



4. Offline Symbolic: Participants shopped for groceries, as in the traditional offline shopping condition, but saw pictures instead of products on the shelves:

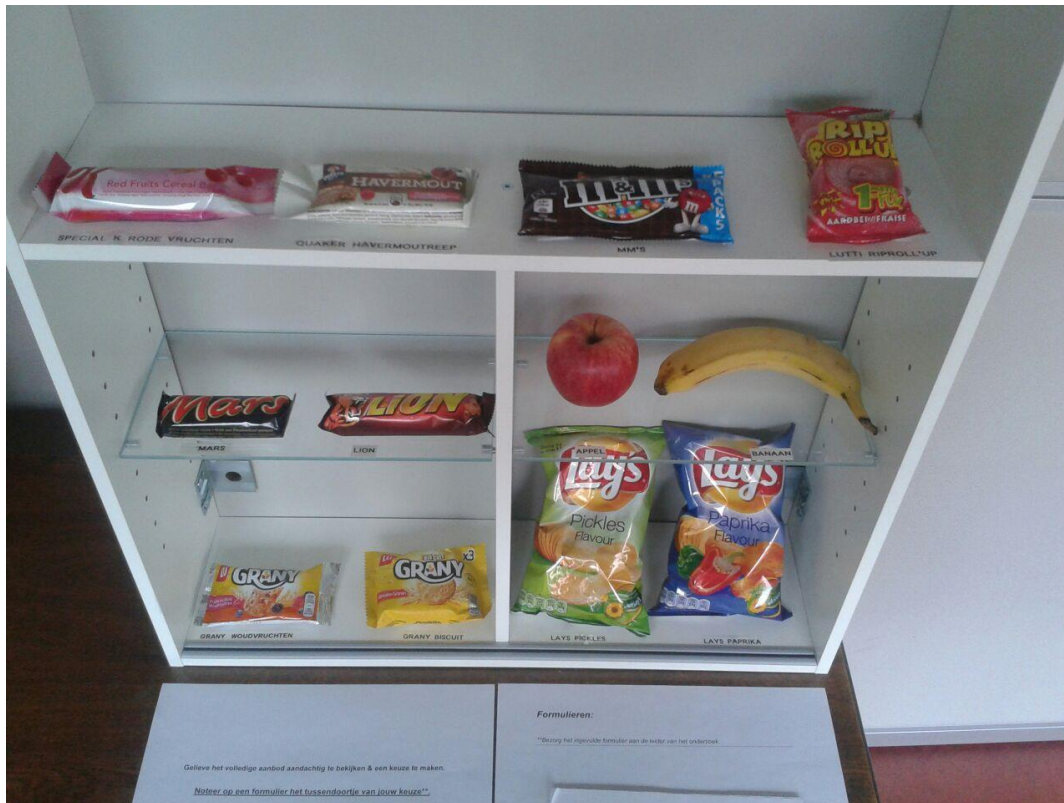


Table A4. Results Manipulation Check (Study 3): Effects of Shopping Channel and Products' Presentation Mode on Participants' Store and Shopping Experience Perceptions, and Shopping Time

		<i>F</i>	<i>p</i> -Value
Store	Shopping Channel	(1, 161) = 1.04	.31
	Presentation Mode	(1, 161) = .61	.44
	Channel X Presentation	(1, 161) = 1.31	.25
Shopping Experience	Shopping Channel	(1, 161) = .57	.45
	Presentation Mode	(1, 161) = .10	.75
	Channel X Presentation	(1, 161) = 1.80	.18
Shopping Time	Shopping Channel	(1, 147) = 2.29	.13
	Presentation Mode	(1, 147) = .06	.80
	Channel X Presentation	(1, 147) = 2.35	.13

8.4 Web Appendix D. Study 4

Offline condition:



Online condition:

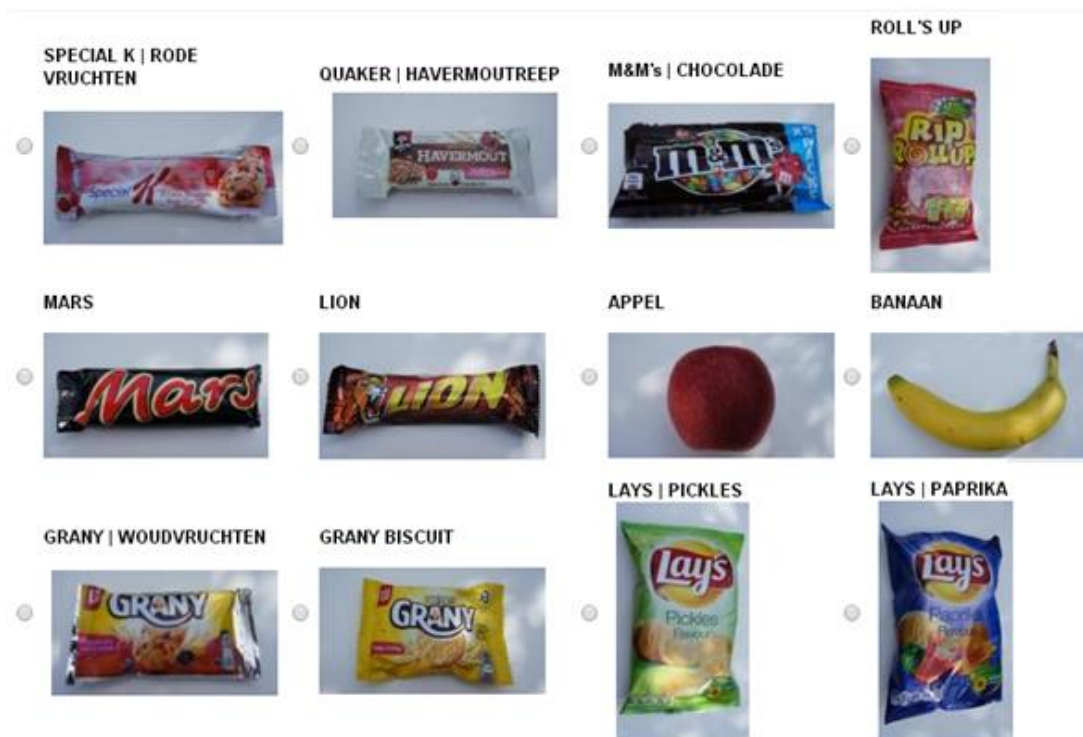


Table A5. Vice Rating, Convenience, and Attractiveness Mean Scores for Selected Snacks (Pretest)

Vice Ratings Below the Scale Midpoint [~Virtues]	Snack Type	Snack	Number of Ratings	Vice Rating	Convenience	Attractiveness
	Fruit		Apple	40	1.73	6.04
		Banana	46	2.07	6.30	5.74
Cereal biscuits		Cereal biscuit with fruit	37	3.30	6.35	4.78
		Natural cereal biscuit	38	3.47	6.24	4.79
Granola bars		Oatmeal bar	42	2.76	6.05	4.58
		Granola bar with fruit	35	3.43	6.16	4.66
Vice Ratings Above the Scale Midpoint [~Vices]	Chips	Paprika chips	37	6.43	6.58	5.70
		Pickled chips	39	6.23	6.40	4.60
	Candy	Chocolate candy pouch	42	6.07	6.36	5.52
		Sour candy	46	6.41	6.16	4.60
	Candy bars	Caramel milk chocolate bar with rice crisps	38	6.08	6.24	4.79
		Caramel milk chocolate bar	38	6.42	6.33	4.26

Product Vividness (adapted from Shiv and Fedorikhin 1999; Cronbach's $\alpha = .93$)

“When I made my choice, I found it ...”:

1 = “Not easy ...” – 7 = “Easy to visualize myself consuming the snack”

1 = “Not easy ...” – 7 = “Easy to imagine myself consuming the snack”

1 = “Not easy ...” – 7 = “Easy to picture myself consuming the snack”

Instant Gratification–Seeking Goal (adapted from Shiv and Fedorikhin 2002; Cronbach's $\alpha = .84$)

“When I made my choice, my goal (unconsciously or not) was one of...”:

1 = “Keeping my impulses in check,” 7 = “Satisfying my impulses”

1 = “Avoiding pleasure,” 7 = “Seeking pleasure”

1 = “Avoiding gratification,” 7 = “Seeking gratification”

1 = “Avoiding indulging,” 7 = “Indulging”

**CHAPTER VI:
HOW ONLINE SHOPPING AFFECTS PRIVATE LABEL
FOOD CHOICES**

CHAPTER VI: HOW ONLINE SHOPPING AFFECTS PRIVATE LABEL FOOD CHOICES

Two independent emerging trends in the market place are (1) an increasing market share of private labels, and (2) a booming popularity of online shopping. In this paper, the authors focus on the crossroad of both trends and investigate if customers' spending on private label food products differs according to the shopping channel they choose (i.e., online vs. offline shopping environment). A database study and lab experiment show that customers spend relatively more money on private label food products online than offline. Moreover, this shopping channel effect arises because consumers' decision-making style is less intuitive online (vs. offline), which leads them to apply the price-quality heuristic to a lesser extent. These findings have important implications for retailers.

1. INTRODUCTION

More and more consumers buy private labels when grocery shopping. Next to this, the Internet is adopted by an increasing number of consumers as an alternative shopping channel for grocery shopping. This raises the question whether or not consumers' brand choices (i.e., private labels versus manufacturer's brands) differ depending on whether they shop in an online versus offline environment. Think of a consumer who chooses to order foods via an online website instead of shopping in a traditional store to purchase foods. Will the amount of money spent on private label food products when the consumer orders online or shops offline vary? No research to date has addressed this question, despite both the applicability and theoretical importance.

A striking trend in developed countries is the expanding popularity of private labels. Private labels are brands introduced, owned and marketed by a retailer. These private labels are in contrast with the manufacturers' brands. According to Nielsen (2014), value share of private labels is at or above 15% in the developed regions of Europe and North America. Multiple factors contribute to this growth: (1) a more positive attitude towards the quality of private labels, (2) a higher concentration in retailing, and (3) they are usually significantly lower priced than manufacturers' brands (e.g., Cuneo, Milberg, Benavente & Palacios-Fenech, 2015; Kumar & Steenkamp, 2007). Another important trend is online grocery shopping. Both in the US and Europe, online shopping has taken off and is expected to show a significant further growth pattern (Centre for Retail Research, 2015). For food and beverages, consumers expressed 44% higher intentions to shop online compared with the 2010 rates (Nielsen 2012) – which suggests that our findings may be of great relevance.

Despite growing research on private labels on the one hand and online consumer behavior on the other hand, research that looks into how and why consumers' interest in private labels might differ between the online and offline channel is scarce. We argue that consumers will spend more money on private label food products when shopping online compared to offline. Because products are symbolically presented (i.e., pictures) online whereas they are physically presented offline (see also Chapter V), we argue that consumers' decisions will be made less intuitive when shopping online (e.g., Hoch & Loewenstein, 1991; Shiv & Fedorikhin, 1999). This less intuitive decision-making style will lead online consumers to rely less on heuristics (e.g., Kahneman, 1982; Kahneman & Frederick, 2002; Thomas & Shanteau, 2002). More specifically, we will examine the price-quality heuristic – which states that a high price indicates a high quality – as this heuristic is widely used when

consumers are evaluating the quality of private labels and brands (Richardson, 1994). Because private labels are usually sold at a lower price than manufacturer's brands, online consumers will spend relatively more money on private label food products than offline consumers. Put together, we argue that online consumers will make less intuitive decisions which will make them less likely to rely on the price-quality heuristic and in turn will lead them spending more money on private label food products compared to offline consumers.

Presenting this unexplored difference between both channels represents an interesting theoretical contribution, but the notion that consumers buy more private label food products online (vs. offline) may also be interesting for retailers. For example, in case retailers are interested in increasing the market share of their private label products, it can be in their interest to make online shopping as attractive as possible. In the next section, we present a theoretical background for our research and develop our hypotheses. After presenting a database study and an experimental study, we look into our results, outline our theoretical contributions and close with practical implications and suggestions for further research.

2. THEORETICAL BACKGROUND

2.1 Private Label Market

Private labels have experienced a massive growth. Nowadays, the annual sales revenue of private labels worldwide reach about one trillion US dollars (Kumar & Steenkamp, 2007; Wu, Yeh, & Hsiao, 2011) with penetration highest in Europe (De Wulf, Odekerken-Schröder, Goedertier & Van Ossel, 2005; Hoch, 1996). Particularly in Switzerland, Spain, the UK and Germany (Nielsen, 2014) the market shares are high and range between 30% and 40%. While the picture for non-food is less clear across Europe, market share of private labels has increased in all countries in 2012 (Symphony IRI Group, 2012). For the United states, total US retail sales of the overall private label food and beverage market were estimated at \$102 billion in 2013, which represents an increase of 2 percent compared to 2012. Food products served for roughly 80 percent or \$80 billion of overall private label retail sales compared to beverage sales that accounted for 20 percent or \$22 billion. Moreover, sales of private label food and beverages are predicted to reach \$122 billion in 2018 (Packaged Facts, 2014). Because private labels are well represented in the food market, we will concentrate on this market to investigate our hypotheses.

Multiple reasons clarify why retailers exploit private labels. Retailers are able to offer more variety to consumers (Amrouche & Zaccour, 2007) and increase store differentiation (Steenkamp & Dekimpe, 1997; Sudhir & Talukdar, 2004) when they offer private labels to their customers. Second, selling private labels allows retailers to expand their negotiation position with national brands' manufacturers (Ailawadi & Harlam, 2004). According to Morton and Zettelmeyer (2004), by offering private labels – the only brands for which retailers can control the assortment, price and positioning on the shelves – retailers can put more pressure on brand manufacturers which leads to more favorable deals. Third, offering private labels may help retailers gain store loyalty and store traffic (Richardson, Jain & Dick, 1996) when their exclusive private labels are well liked by the consumers. Finally, research shows that percentage retail margins on private labels are higher than on manufacturers' brands and that a good balance between both types of brands is necessary to attract and retain the most profitable consumers (Ailawadi & Harlam, 2004).

Not surprisingly, the private label gained significant academic attention. Taking a look at previous research concerning the role of private labels versus manufacturer's brands, some researchers focused on the price competition between both types of brands (Aggarwal & Cha, 1998; Sethuraman, Srinivasan & Kim, 1999), whereas other researchers examined price and advertising strategies (e.g., Makoto, 1995) or manufacturers' and retailers' strategies (Steenkamp & Geyskens, 2014). Moreover, previous research has investigated the determinants of successful private labels (Dhar & Hoch, 1997; Hoch & Banerji, 1993), looked into consumers' purchase behavior of private labels (Erdem, Zhao & Valenzuela, 2004; Richardson 1997) or studied the effectiveness of promotion on manufacturers' brands and private labels purchases (e.g., Garretson, Fisher & Burton, 2002). However, not much is known yet about how the shopping channel could affect consumers' brand choices, a gap we would like to help close with this paper.

2.2 Online Retailing

Next to the private label trend is the emergence of the Internet as a distribution and communication channel and the success of online shopping. Although online shopping figures are currently modest in many countries, they are briskly growing. According to the Centre for Retail Research (2015), the online market share of the European retail market was 6.3% in 2013, growing to 7.2% in 2014, and rising to 8.4% in 2015. The highest market shares were documented in the UK (13.5%), Germany (10.0%) and Sweden (7.6%) and market shares are

expected to grow further in 2015 to reach 15.2%, 11.6% and 7.8% respectively. In the US, online sales were estimated to reach 306.85 billion dollar in 2014. Moreover, online retail in the US is expected to grow significantly – but relatively more slowly than Europe – by 13.8% to a \$349.20 billion in 2015 compared with Europe’s 18.4% growth rate to a \$253.98 billion.

The trend in online shopping has served as a catalyst for new research in consumer behavior. As such, several researchers have studied consumer behavior across online and offline channels in different contexts. According to Cheung, Chan and Limayem (2005), research on the determinants of online consumer behavior can be separated into five major domain areas: consumer characteristics (e.g., Goldsmith, 2000; Limayem, Khalifa & Frini, 2000), environmental influences (e.g., Markus & Soh, 2002), product characteristics (e.g., Jarvenpaa, Tractinsky & Vitale, 2000, Liao & Cheung, 2001), medium characteristics (e.g., Chau, Au, & Tam, 2000), and online merchant and intermediary characteristics (e.g., Lee, 2002; Lee & Park, 2009).

2.3 Private Labels in Online versus Offline Shopping Environments

Extensive research has thus focused on the impact of private labels or on online consumer behavior, but there is little research that combines these research streams. However, Arce-Urriza and Cebollada (2012) investigated the competition between private labels and manufacturer’s brands in both shopping channels. They show that loyalty increases online for both private labels and manufacturer’s brands, but that only private labels increase their market share and conquering power online. Whereas they have conducted analyses on the brand level, we will conduct our analyses on the consumer level. More specifically, in this paper we will investigate whether consumers who shop in the online channel spend fewer or more money on private label products compared to when they shop in the offline channel by comparing their proportions spent on private labels. Afterwards, we will shed light on the underlying process.

2.4 Offline and Online Shopping Environments: Difference in Decision-Making Style

When people are making decisions, those decisions can occur automatically or rather deliberately. This two-system model of processing has been given diverse names, but is usually referred to as a dual-process theory (e.g., Chaiken & Trope, 1999; Hammond, 1996; Kahneman & Frederick, 2002; Stanovich & West, 2000) and generally corresponds to what

most people think of as ‘intuition’ and ‘cognition’. Stanovich and West (2000) and Kahneman and Frederick (2002) specified the two modes of processing as System 1 and System 2. Decisions induced by System 1 processing correspond to intuition. These decisions are made quickly and are often a result of nonconscious processing including affective feelings. They need low processing skills or energy expenditure and take place spontaneously. In contrast, decisions relying on System 2 processing, correspond to what most consumers think of as intellectual reasoning. These decisions are slower and more effortful. Additionally, they are more conscious and involve rational choice (Kahneman, 2011).

When shopping for groceries consumers have to make several decisions and depending on which shopping channel they frequent, this decision making occurs in an offline or an online environment. Both environments differ in several respects, but recent research has shown that especially the difference in product presentation could be important (Huyghe et al. 2016, forthcoming): whereas products are physically presented offline, they are symbolically presented online (i.e., by means of pictures). In an offline environment, consumers can directly observe sensorial information (e.g., touch, smell) from the physical presence of the products. In contrast, there is less potential for consumers to perceive information with their senses in an online environment. According to Hoch and Loewenstein (1991), symbolically presented products create more sensory distance than physically presented products, making it less likely to evoke an intuitive (i.e., spontaneous, affect-based) decision. Additionally, Shiv and Fedorikhin (1999), who distinct between lower-order affective decisions (i.e., automatic processing) and higher-order affective decisions (i.e., more controlled processing), show that consumers were less influenced by an automatic process when they had to choose a product that was symbolically presented as opposed to when it was physically presented.

To summarize, because consumers in an online environment are confronted with the symbolic presentation of the products whereas offline consumers encounter the physical products, and because product presentation affects decision-making style (Hoch & Loewenstein, 1991; Shiv & Fedorikhin, 1999), we hypothesize that the shopping environment will affect consumers’ decision-making style:

H₁: In an online environment, decisions will be made less intuitive than in an offline environment.

2.5 The Role of the Price-Quality Heuristic in Decision Making

When making intuitive decisions, consumers tend to rely on heuristics (Kahneman, 1982; Thomas & Shanteau, 2002). According to Kahneman and Frederick (2002), heuristics can be seen as intuitive, automatic processing (i.e., System 1), which may be overridden by analytic reasoning (i.e., System 2). When consumers go shopping, they are confronted with both wide and deep assortments of products, regardless of the shopping environment (i.e., online or offline). In order to cope with the large amount of information and choices, consumers may use heuristics (Tversky & Kahneman, 1974). These heuristics are mental short cuts that reduce the cognitive burden associated with decision making (Kahneman & Frederick, 2002; Shah & Oppenheimer, 2008). Shah and Oppenheimer (2008) suggested that heuristics may reduce effort in decision making in several ways. Heuristics give the user the ability to consider fewer cues and/or alternative choices in decision making. In addition, heuristics decrease the work of retrieving and storing information. Finally, they streamline the decision making process by diminishing the amount of integrated information necessary in making the choice.

A heuristic that is especially triggered by a large amount of information is the price-quality heuristic. We focus on this price-quality heuristic for two reasons. First, consumers may use this heuristic to evaluate the quality of private labels and brands (Richardson, 1994): by relying on price, they evaluate the quality of a product and perceive private labels as inferior to manufacturer's brands. Second, this heuristic is especially relevant in a grocery shopping context where many SKU's and thus a large amount of information is present.

A study of Cronley et al., (2005) shows that participants who were confronted with 50 manufacturer brands relied more on the price-quality heuristic than participants who were confronted with 25 manufacturer brands. When using this heuristic, consumers relied on price as a cue to infer product quality and ascribed high quality to a high priced product (Kirmani & Rao 2000; Rao 2005). The relative impact of price on quality perceptions has received abundant attention from consumer scholars. McConnell (1968) showed that increasing the price for the same product (e.g., the same beer labeled with different prices) enhanced quality perceptions. They investigated the effect of price on quality perceptions without any other cues. Kardes and colleagues (2004, 2008) examined whether the impact of price on perceived quality changed when other attributes were also displayed to consumers. Their results show that participants consistently relied on price when asked to make quality judgments, even

when other attributes (e.g., type of wine) were also presented (Kardes, Cronley, Kellaris & Posavac, 2004; Kardes, Posavac, Cronley & Herr, 2008).

Given that (1) consumers in an online environment are expected to make less intuitive decisions (e.g., Hoch & Loewenstein, 1991; Shiv & Fedorikhin, 1999), (2) heuristics such as the price-quality heuristic are more likely used when consumers are in an intuitive state (e.g., Kahneman, 1982; Kahneman & Frederick, 2002; Thomas & Shanteau, 2002), and (3) relying on the price-quality heuristic is at the disadvantage for private labels since consumers will automatically associate their lower price with a lower quality, we propose that consumers will choose relatively more private label food products in an online environment compared to an offline environment. Thus, we hypothesize:

H₂: A less intuitive decision-making style will lead to a lower use of the price-quality heuristic.

H₃: Consumers will spend relatively more money on private label food products when they shop in an online compared with an offline environment.

With these predictions, we attempt to contribute to extant literature in several ways. First, we connect the online consumer behavior research with the private labels and manufacturers' brands research and show empirical evidence that online consumers spend relatively more money on private label food products than offline consumers. Second, we contribute to the sensorial information literature (Hoch & Loewenstein, 1991; Shiv & Fedorikhin, 1999; by showing that consumers' decisions will be made less intuitive in an online compared to offline environment. Third, our results complement previous research that looks at the price-quality heuristic (e.g., Kardes et al., 2004; 2008; Kirmani & Rao, 2000; Rao, 2005) by demonstrating that applying the heuristic to a lesser extent leads consumers to spend relatively more on private label food products. Fourth, we add to extant literature regarding the influence of private labels and manufacturers' brands in an offline context (e.g., Erdem et al., 2004; Richardson, 1997).

In this paper, we use online and offline actual shopping data and complement this with an experimental study that simulates an offline and online store. As such, we maximize both the external and internal validity. More specifically, we report differences in actual shopping behavior to highlight the importance and relevance of consumer's spending on private labels. Using data linked to the customer loyalty cards of a large European retailer, we show that the

same customers spent relatively more on private label food products when they ordered online rather than when shopping offline (Study 1). Study 2 replicates the effect, while also providing empirical evidence for the underlying mechanism of the difference in money spent on private label food products in online versus offline channels: consumers make less intuitive decisions online which makes them less likely to rely on the price-quality heuristic and in turn leads them to spend relatively more on private label food products.

3. STUDY 1

With Study 1 we replicate the results of Arce-Urriza and Cebollada and test in a real-world setting if online consumers spend relatively more money on private label food products than offline consumers. To this end, we analyze actual shopping data from a large European retailer that (1) offers both private labels and manufacturer's brands, and (2) operates both a chain of brick-and-mortar grocery stores and an online store. Unfortunately, the database is restricted to snacks only. Although it is regrettable that we do not have access to more different types of food products, this may not pose too big of a problem. First, snacks are a product category in which private labels are very common. For example, Mintel's Global New Products Database (2013) shows that snacks – together with bakery, sauces and seasoning – accounted for 40% of private labels launches between 2008 and 2012. Second, the snacks in this study consist of both strong private labels and manufacturer's brands.

Importantly, the retailer offers the same assortment at the same prices in both its online and offline stores. Moreover, no advance payment is available for orders placed online. As such, payment of offline as well as online purchases occurs in one of the retailer's brick-and-mortar stores, and this in cash or with a debit card. As Bagchi and Block (2011) and Thomas, Desai, and Seenivasan (2011) show that payment methods differentially impact consumers' pain of payment perceptions (e.g., credit cards typically diminish pain of payment), they could affect how much consumers spend on private label products (vs. manufacturer branded products). That is, higher pain of payment perceptions likely amplify consumers' perceptions towards private label products as opposed to manufacturer branded products. By ensuring an identical payment mode in both channels, we thus explicitly account for this potential confound.

3.1 Data

The retailer provided information on snack products (such as candy bars, chocolate, chips, sweets and chewing gum, and salty snacks) of a 10% random sample of its customers possessing a loyalty card, over a period of four months (January–April) in 2013. We distinguish three types of customers: (1) those who purchase products exclusively by frequenting the retailer’s offline stores, (2) those who order exclusively through the retailer’s online store, and (3) those who buy offline on some occasions and online on others. As single-channel online and offline customers likely differ on a socio-demographic level (e.g., online grocery customers tend to be older, more educated, and wealthier; Morganosky and Cude 2002) and because proneness towards purchasing private label products is closely related to socio-demographics such as age, education and income (Richardson, Jain & Dick, 1996), we follow prior research and focus on mixed channel customers who shop both online and offline (e.g., Chu, Arce-Urriza, Cebollada & Chintagunta, 2010; Chu, Chintagunta & Cebollada, 2008; Pozzi, 2013; Shankar, Smith & Rangaswamy, 2003). In total, we obtained information about 28,162 receipts from 3,206 different mixed channel customers. Most of these receipts were from offline purchases (67.84%). For each receipt by each customer, the database specifies the brand of the snacks they purchased (i.e., private label vs. manufacturer brand), the price of each snack, the total receipt’s price and the shopping channel used. We compare the relative amount of money spent on private label snacks (vs. manufacturer branded snacks) when mixed-channel customers ordered groceries online versus when they shopped offline. We do not solely focus on comparing the number of private label snacks because they can be bought in various package sizes. For example, one item of Twix candy bars can be one single Twix or one family pack of Twix. As such, comparing the number of private label snacks can give a distorted view. Therefore, we look at the relative amount of money spent on private label snacks.

3.2 Results

As the database comprises information about multiple receipts by each customer, we need a multilevel analysis that takes this hierarchical data structure into account (Bryk & Raudenbush, 1992; Snijders & Bosker, 1999). The total amount of money spent on snacks relative to the amount of money spent on private label snacks served as the dependent variable, and shopping channel (online versus offline) as the independent variable. To account

for customer-level effects, we estimated both the intercept and the slope randomly. That is, a fixed-effects model yielded a -2 restricted log-likelihood value (-2LL) of 2,979.52, but the model fit improved significantly when we allowed for a random intercept estimation (-2LL = -832.44; $\Delta\chi^2 = 3,811.96$, $\Delta df = 1$, $p < .001$). Model fit improved even further when we allowed the slope of the shopping channel to vary for each customer, such that the -2LL reached -1069.24 ($\Delta\chi^2 = 236.30$, $\Delta df = 1$, $p < .001$). Importantly, the analysis revealed a significant difference in the relative amount of money spent on private label snacks online versus offline. Mixed channel customers spent relatively more on private label snacks when they ordered online ($M_{\text{Online}} = .123$, $SD = .281$) compared to when they shopped offline ($M_{\text{Offline}} = .093$, $SD = .242$; $F(1, 4425.18) = 1,782.55$, $p < .001$).

3.3 Discussion

Study 1 provides evidence based on actual shopping data, in support to our prediction that online consumers purchase relatively more private label snacks than offline consumers (H_3). Although using actual shopping data greatly enhances the external validity of this finding, we acknowledge several limitations regarding the study's data.

First, we recognize that mixed-channel customers might engage in online grocery shopping for different reasons than what prompts them to shop offline (Rohm & Swaminathan 2004). However, as single-channel online and offline customers are expected to differ on a socio-demographic level (Morganosky & Cude 2002) and socio-demographics are linked to the proneness to buy private labels (Richardson, Jain & Dick, 1996), comparing the online and offline purchases of mixed customers allows us to avoid these confounds.

Second, our data pertains to snacks only. Although, we regret not having data on other food products, we believe that reporting customers' private label spending of snacks has attenuated rather than reinforced the magnitude of the hypothesized effect. Indeed, for snacks consumers are typically far less inclined to purchase private label products over manufacturer branded products due to the larger perceived quality discrepancy between them (Nair, 2015). Testing H_3 on customers' snack purchases thus constitutes a rather conservative assessment.

Noting these findings and limitations, we seek to confirm support for H_3 in a controlled laboratory experiment.

4. STUDY 2

The purpose of Study 2 is threefold. First, we aim to replicate the findings of Study 1 in a controlled laboratory experiment allowing to control consumers' shopping motives. Second, we intend to bolster the effect's robustness by testing (1) a broader range of food products, and (2) a private label of a different retailer than employed in Study 1 to avoid idiosyncratic effects. Third, we seek to provide evidence regarding the underlying effect that leads consumers to purchase more private label food products when grocery shopping online versus offline. As hypothesized, we expect consumers' decision making to be less intuitive online than offline (H_1), leading to a decreased reliance on the price-quality heuristic (H_2), which in turn leads online consumers to spend relatively more money on private label food products (H_3).

4.1 Method

4.1.1 *Participants and design*

Seventy-eight undergraduate students (21 men; $M_{\text{age}} = 22.60$ years, $SD = 1.41$) from a large Western European university participated in this experimental lab study, in return for a chance to win a gift-certificate. To re-test whether consumers will spend relatively more money on private label food products when they shop for groceries online instead of offline (H_3), we set up a between-subjects design with two conditions (shopping channel: online vs. offline) in which we mimic a traditional online and offline grocery shopping context.

4.1.2 *Pretest*

To bolster the robustness of the effect observed in Study 1, we sought to employ a different private label than the ones used in Study 1. Hereto, we pretested consumers' attitude towards and familiarity with three well-established private labels (i.e., Delhaize, Spar, and Carrefour). In total, 79 undergraduate students from the same university population as the one participating in the experimental study (24 men; $M_{\text{age}} = 21.29$ years, $SD = 1.21$), filled out this survey in return for a chance to win a gift-certificate. Each respondent rated for each private label (1) their attitude towards the private label on a seven-point Likert scale (1 = "Very negative," 7 = "Very positive") and (2) their familiarity with it (0 = "Not familiar at all," 100

= “Very familiar”). On the basis of these ratings, we selected the most neutral private label. In other words, we selected the private label to which participants hold a neutral attitude and are equally familiar with. The chosen private label is thus not perceived as extremely positive nor extremely as negative, both in terms of attitude and familiarity. To this end, we ran a first repeated measures ANOVA with the attitude measures of the three private labels as within-subject factor. This analysis revealed a significant difference in attitude measures ($F(2, 77) = 46.90, p < .001$). The private label ‘Carrefour’ came up at the middlemost place ($M_{\text{attitude Carrefour}} = 4.75, SD = .13$). Its attitude was significantly lower than the attitude towards the private label Delhaize ($M_{\text{attitude Delhaize}} = 5.59, SD = .97; F(1, 78) = 32.55, p < .001$), and significantly higher than the attitude towards the private label Spar ($M_{\text{attitude Spar}} = 4.16, SD = .99; F(1, 78) = 13.29, p < .001$). In a similar vein, we ran a second repeated measures ANOVA with the familiarity measures of the three private labels as within-subject factor. This analysis showed a significant effect in familiarity measures ($F(2, 77) = 34.57, p < .001$). Also here the private label Carrefour took a neutral position ($M_{\text{familiarity Carrefour}} = 56.84, SD = 29.97$) and its familiarity was significantly lower than the familiarity with the private label Delhaize ($M_{\text{familiarity Delhaize}} = 69.52, SD = 26.03; F(1, 78) = 8.86, p < .01$), and significantly higher than the familiarity with the private label Spar ($M_{\text{familiarity Spar}} = 33.11, SD = 30.94; F(1, 78) = 33.88, p < .001$).

4.1.3 Procedure

Upon arrival in the lab, participants were informed that they would be participating in a study with the ostensible goal of gaining insights into which types of food products students buy on typical shopping trips. To ensure identical purchase motives, all participants read the same scenario, which indicated they needed to shop for groceries for the next five days, with a budget of 50 euros and no food supplies left at home. Moreover, the instructions explicitly indicated that they were not required to spend their entire budget and only had to take their own needs and preferences into account. Participants were then randomly assigned to one of the two conditions.

Participants assigned to the offline shopping condition were one by one instructed to move to another room, which contained a small experimental store with 208 grocery food products that were arranged in 104 pairs, of which each pair comprised one private label product and one manufacturer branded product. These product pairs were arranged on either the front or back of a retail shelf and organized into unlabeled product categories (see

Appendix). The food products were selected from the assortment of a small grocery store located near the university that carried the pretested private label 'Carrefour'. Within product categories frequently purchased by the student population participating in this study (i.e., biscuits, bread, cereals, candy bars, chocolate, chips, dairy desserts, pasta, soup, pizzas, condiments, salty snacks, soft drinks, sweets, canned vegetables and fruit, yogurt, milk and water), we randomly selected several food products for which we matched the private label product with the market leader product. On the retail shelves, we also placed these pairs next to one another. Neutral shelf tags indicated the products' private label or brand name and price. Private label products' prices were on average 33.8 % cheaper than the manufacturer branded products ($M_{\text{private label}} = 1.43$, $SD = .62$; $M_{\text{manufacturer's brand}} = 2.16$, $SD = .86$).

When arriving in the experimental store, participants were provided with a shopping basket in which they could put their chosen products. When they finished shopping, they left their basket in the room and returned to their computer in the other room. One of the researchers then recorded the chosen products and returned them to the shelves before the next participant arrived. Participants randomly assigned to the online shopping condition instead remained seated in front of their computer and shopped in an online grocery store, created specifically for this study. We kept the product assortment and prices constant across the online and offline condition. In the online condition, the store resembled a typical online grocery store, with products in product categories (e.g., chocolate, confectionary, dairy, fruit and vegetables; see Appendix). If they clicked on a product category, participants could view pictures of the products within that category. Below the pictures, the website indicated the products' private label or brand name and price. As in the offline condition, private label products and corresponding products branded by a manufacturer were also displayed next to one another in the web store. Participants made their purchase decisions by placing products in a virtual shopping basket and when finished shopping submitted their order on the site.

After completing the grocery shopping task either offline or online, participants completed a questionnaire in which they indicated their decision-making style during the task on five seven-point Likert items (e.g., "When I make decisions, I tend to rely on my intuition"; Cronbach's $\alpha = .76$) with higher scores indicating a more intuitive decision-making style (adapted from Scott and Bruce (1995)). Subsequently, they filled out to what extent they relied on the price-quality heuristic. Therefore, we adapted Sinha and Batra's (1999) four-item seven-point Likert scale that measures consumers' price-quality associations (e.g., "In my opinion, higher prices of brands usually mean higher quality"; Cronbach's $\alpha = .81$) so that

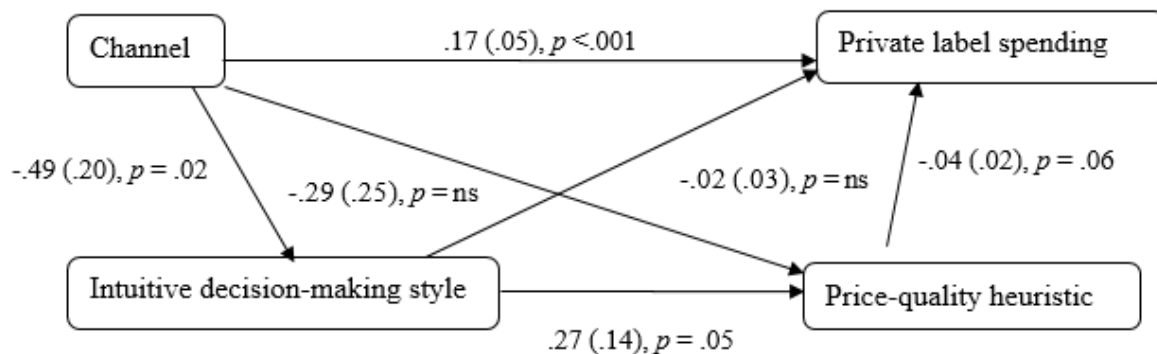
higher values indicated more relying on this heuristic. Finally, all participants provided socio-demographic information, such as their age and gender.

4.2 Results

To test whether consumers spend relatively more money on private label food products when they shop for groceries online versus offline (H_3), we ran an ANOVA with shopping channel as the independent variable and the relative amount of money spent on private label food products in shopping baskets as the dependent variable. This analysis revealed a significant difference in the relative money spent on private label food products being purchased online versus offline ($F(1, 76) = 17.18; p < .001$). As expected, participants spent relatively more money on private label food products when they ordered their groceries online ($M_{\text{Online}} = .579, SD_{\text{Online}} = .229$) than when they shopped offline ($M_{\text{Offline}} = .382, SD_{\text{Offline}} = .188$).

To test for the proposed underlying reason why online consumers spend relatively more money on private label food products than offline consumers, we conducted a serial mediation analysis with shopping channel (0 = Offline, 1 = Online) as the independent variable and the relative spending on private label food products in shopping baskets as the dependent variable, and with intuitive decision-making style and use of the price-quality heuristic as mediators. We used bias-corrected bootstrapping with 10,000 bootstrap samples to generate a 95% confidence interval (CI) around the indirect effect through both mediators in serial order, where mediation occurs if the CI excludes zero (Hayes 2009, 2013). The bootstrapping results revealed a significant serial indirect effect ($ab = .01$, standard error [SE] = .01; 95% CI = [.002, .024]), in support of our conceptual serial mediation model. In line with our expectations, participants who shopped online (vs. offline) employed a less intuitive decision-making style, leading them to rely less on using a price-high heuristic, which as such increased their relative spending on private label food products (see Figure 1).

Figure 1. Serial mediation model (Study 2)



4.3 Discussion

Study 2 replicates the findings of Study 1 in a controlled laboratory environment, using a broader range of food products and a different private label to avoid idiosyncratic effects. Participants who ordered groceries online purchased relatively more private label food products, in terms of spending compared to those who shopped offline (H_3). As we still observe the effect when we control for consumers' shopping motives, this study rules out this potential confound from Study 1 as alternative account. Instead, this study provides process evidence in support to our conceptual model outlined in H_1 and H_2 . As expected, participants relied less on higher prices as a heuristic cue for quality when they shopped online (vs. offline), due to the less intuitive decision-making style being applied, leading them to spend relatively more money on private label food products.

The relative spending on private labels is higher for both online and offline consumers in this controlled laboratory study. First, the experimental shopping settings enabled direct comparison of private label food products and food products branded by a manufacturer as they were positioned next to one another. This artificial manner of positioning products might have drawn their attention towards weighing the benefits and pitfalls of private labels versus manufacturer's brands. Second, students participated in this study. It is likely that they are more inclined to buy private label products and less manufacturer branded products than a regular customer because students typically have a limited budget to spend.

5. GENERAL DISCUSSION

The results obtained from a database and experimental study provide consistent evidence for our proposition that consumers spend relatively more money on private label

food products online than offline. Because the decision-making style of online consumers is less intuitive than those of offline consumers, they apply the price-quality to a lesser extent, which leads these online consumers to buy relatively more private label food products than offline consumers.

Although both studies provide strong support for our main proposition, each study also makes a unique contribution. Study 1 relies on actual shopping data, collected from customers who frequent both online and offline stores run by one and the same retailer. The same customers thus purchase more private label snacks when they order their groceries online (vs. offline), as evidenced by actual sales data. Study 2 encompasses a broader array of foods in a controlled laboratory environment and shows that the difference in decision-making style and appliance of the price-quality heuristic are key drivers of the difference on money spent on private label food products online and offline.

5.1 Theoretical Contributions

This manuscript contributes to marketing theory in several ways. First, this research connects the online consumer behavior stream with the private labels versus manufacturer's brands stream. We contribute to the research of Arce-Urriza and Cebolla (2012) by providing empirical evidence on the level of the consumers which shows that the proportion spent on private label food products differs between the online and offline channel.

Second, by comparing online and offline shopping contexts, which present products in symbolic and physical manners, respectively, we add to the sensorial information literature (e.g., Hoch & Loewenstein, 1991; Shiv & Fedorikhin, 1999). For example, Hoch and Loewenstein (1991) showed that sensory distance differs between symbolically and physically presented products, while Shiv and Fedorikhin (1999) looked at the relationship between physical versus symbolic presence and automatic versus controlled processing. In this paper, we directly compare an offline and online environment and show that the decision-making style differs in the online and offline environment.

Third, our results complement previous research that looks at the price-quality heuristic (e.g., Kardes et al., 2004; 2008; Kirmani & Rao, 2000; Rao, 2005). By testing this heuristic both in an online and offline context we provide evidence that consumers tend to rely less on this heuristic when they are ordering their products online than when they are buying their products offline.

Fourth, we add to extant literature regarding the influence of private labels and manufacturer's brands in an offline context (e.g, Erdem et al., 2004; Richardson, 1997). Rather than focusing on the impact private label products have in a single channel, we reveal that the selected shopping channel may affect the money spent on private label food products due to the difference in decision-making style and application of the price-quality heuristic.

5.2 Consumers and Managerial Implications

Retailers might benefit from our findings that customers' baskets differ in online versus brick-and-mortar stores, as well as why purchase decisions might differ across these environments. Our results show that consumers will rely less on the price-quality heuristic in the online channel and thus spend relatively more money on private label food products. Therefore, retailers can make their online channel more appealing in order to increase the market share of their private labels. This improves the profitability of retailers, because extant research has shown that percentage retail margins on private label products are higher than on products branded by a manufacturer (Ailawadi & Harlam, 2004).

5.3 Limitations and Further Research

This study has several limitations that suggest avenues for further research. First, our results are limited to the food category. Therefore, we cannot generalize our findings to non-food products. However, according to Technavio, the private label food and beverages market is expected to increase with a mean annual growth rate of 4.65% during the period 2014-2019, which makes these food products very valuable to explore.

Second, we conducted both studies in a single European country. The relative prices and quality of private labels and manufacturer brands, and adoption rates of online shopping vary across countries, so the impact of shopping channels on the purchase of private label food products and manufacturer branded food products might differ across countries too. Further research might seek to replicate our findings in other countries. However, the impact of symbolic versus physical product presentation on sensory distance (Hoch & Loewenstein, 1991) and automatic versus controlled processing (Shiv & Fedorikhin, 1999) and the reliance on the price-quality heuristic (McConnelly, 1968; Kardes, 2004; 2008) has been demonstrated in a U.S. context, so we predict that the reported difference between online and offline shopping we observed in our European context holds elsewhere.

Third, our experimental study used data gathered from a single, hypothetical shopping trip. Thus, we could assess only the extent to which online and offline shoppers made distinct choices at one specific moment in time. Our database study contains information about customers' actual grocery purchases over four months, from a single retailer. Additional research should include multiple retailers and consider the long-term effects.,

Fourth, we can assume that not each private label or manufacturer's brand is equally strong. For example, is the private label 'A' stronger, equally strong or less strong than the private label 'B'? And how would that affect our results? Future research can examine whether the strength of the private label moderates the shopping channel effect. Possibly the observed effect only holds for (moderately) strong private labels while the low quality of weak private labels withholds consumers from buying them irrespective of the shopping channel.

This study provides evidence on how the shopping channel affects private label spending of foods. Consumers are likely to spend relatively more money on private label food products online than offline, because they make their decisions less intuitive online and apply the price-quality heuristic to a lesser extent. These findings can be beneficial for retailers who operate both in the online and offline channel and have adopted private labels next to manufacturer brands.

6. REFERENCES

- Aggarwal, P. and Cha, T. (1998), "Asymmetric price competition and store vs national brand choice," *Journal of Product & Brand Management*, Vol. 7 No. 3, pp. 244-253.
- Ailawadi, K.L. and Harlam, B. (2004), "An empirical analysis of the determinants of retail margins: the role of store-brands share," *Journal of Marketing*, Vol. 68 No. 1, pp. 147-165.
- _____, Pauwels, K. and Steenkamp, J-B. (2008), "Private-label use and store loyalty," *Journal of Marketing*, Vol. 72 No. 6, pp. 19-30.
- Amrouche, N. and Zaccour, G. (2007), "Shelf-space allocation of national and private brands," *European Journal of Operational Research*, Vol. 180 No. 2, pp. 648-663.
- Arce-Urriza, M. and Cebollada, J. (2012), "Private labels and national brands across online and offline channels," *Management Decision*, Vol. 50 No. 10, pp. 1772-1789.
- Bagchi, R. and Block, L.G. (2011), "Chocolate cake please! Why do consumers indulge more when it feels more expensive?," *Journal of Public Policy & Marketing*, Vol. 30 No. 2, pp. 294-306.
- Bryk, A. S. and Raudenbush, S.W. (1992), *Hierarchical linear models: Applications and data analysis methods*. Newbury Park, CA: Sage.
- Centre for Retail Research (January 2015), "Online retailing in Europe, the U.S. and Canada, 2015-2016", available at http://www.retailmenot.com/corp/static/filer_public/86/ed/86ed38d1-9cb9-461c-a683-ab8e7b4e1ffc/online_retailing_in_europe_us_and_canada.pdf (accessed October 30).
- Chaiken, S. and Trope, Y. (1999), *Dual-Process Theories in Social Psychology*. New York: Guilford Press.
- Chau, P.Y.K., Au, G. and Tam, K.Y. (2000), "Impact of information presentation model on online shopping; An empirical evaluation of broadband interactive shopping service," *Journal of Organizational Computing and Electronic Commerce*, Vol. 10 No. 1, pp. 1-22.
- Cheung, C.M.K., Chan, G.W.W. and Limayem, M. (2005), "A critical review of online consumer behavior: Empirical research," *Journal of Electronic Commerce in Organizations*, Vol. 3 No. 4, pp. 1-19.

- Chu, J., Arce-Urriza, M., Cebollada, J.J. and Chintagunta, P.K. (2010), "An empirical analysis of shopping behavior across online and offline channels for grocery products: The moderating effects of household and product characteristics," *Journal of Interactive Marketing*, Vol. 24 No. 4, pp. 251-268.
- , Chintagunta, P.K. and Cebollada, J. (2008), "A comparison of within-household price sensitivity across online and offline channels," *Marketing Science*, Vol. 27 No.2, pp. 283-299.
- Cronley, M.L., Posavac, S.S., Meyer, T., Kardes, F.R., and Kellaris, J.J. (2005), "A selective hypothesis testing perspective on price-quality inference and inference-based choice," *Journal of Consumer Psychology*, Vol.15 No.2, pp. 159-169.
- Cuneo, A., Milberg, S.J. and Palacios-Fenech, J. (2015), "The growth of private label brands: A worldwide phenomenon?," *Journal of International Marketing*, Vol. 23 No. 1, pp. 72-90.
- De Wulf, K., Odekerken-Schröder, G., Goedertier, F., and Van Ossel, G. (2005), "Consumer perceptions of store brands versus national brands," *Journal of Consumer Marketing*, Vol. 22 No.4/5, pp. 223-232.
- Dhar, S.K. and Hoch, S.J. (1997), "Why store brand penetration varies by retailer," *Marketing Science*, Vol. 16 No. 3, pp. 208-227.
- Erdem, T., Zhao, Y. and Valenzuela, A. (2004), "A performance of store brands: a cross-country analysis of consumer store brand preferences, perceptions and risk," *Journal of Marketing Research*, Vol. 41 No. 1, 99. 86-100.
- Garretson, J.A., Fisher, D. and Burton (2002), "Antecedents of private label attitude and national brand promotion attitude: Similarities and differences," *Journal of Retailing*, Vol. 78 No. 2, pp. 91-99.
- Goldsmith, R.E. (2000), "How Innovativeness Differentiates Online Buyers," *Quarterly Journal of Electronic Commerce*, Vol. 1 No. 4, pp. 323-333.
- Hammond, K.R. (1996), "Human judgment and social policy. New York: Oxford University Press.
- Hayes, A.F. (2009), "Beyond Baron and Kenny: Statistical mediation analysis in the new millennium," *Communication Monographs*, Vol. 76 No.4, pp. 408-420.
- (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis*, New York: Guilford Press.
- Hoch, S.J. (1996), "How should national brands think about private labels?," *Sloan Management Review*, Vol. 37 No. 2, pp. 89-102.

- Hoch, S.J. and Banerji, S. (1993), "When do private labels succeed," *Sloan Management Review*, Vol. 34 No. 4, pp. 57-67.
- Hoch, S.J. and Loewenstein, G.F. (1991), "Time-inconsistent preferences and consumer self-control," *Journal of consumer research*, Vol. 17, pp. 492-507.
- Huyghe, E., Verstraeten, J., Geuens, M. and Van Kerckhove, A. (2016); "Clicks as a healthy alternative to bricks: How online grocery shopping reduces vice purchases," *Journal of Marketing Research*, forthcoming.
- Jarvenpaa, S.L., Tractinsky, N. and Vitale, M. (1999), "Consumer trust in an Internet store," *Information Technology & Management*, Vol. 1 No. 1-2, pp. 45-71.
- Kahneman, D. (1982), "The simulation heuristic," in *Judgement under uncertainty: Heuristics and biases*, ed. Daniel Kahneman, Paul Slovic, and amos Tversky, New York: Cambridge University Press, pp. 201-208.
- Kahneman, D. (2011), *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux.
- Kahneman, D., and Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin & D. Kahneman (Eds.), *Heuristics and Biases* (pp. 49–81). New York: Cambridge University Press.
- Kardes, F.R., Cronley, M.L., Kellaris, J.J. and Posavac, S.S. (2004), "The role of selective information processing in price-quality inference," *Journal of Consumer Research*, Vol. 31 No. 2, pp. 368-374.
- _____, Posavac, S.S., Cronley, M.L. and Herr, P.M. (2008), "Consumer Inference," in *Handbook of Psychology*, ed. Haugtvedt C.P., Herr, P.M. and Kardes, F.R., Mahaw, NJ: Erlbaum, pp. 165-191.
- Kirman, A. and Rao, A.R. (2000). No pain, no gain: A critical review of literature on signaling unobservable product quality," *Journal of Marketing*, Vol. 64 No. 2, pp. 66-79.
- Kumar, N. and Steenkamp, J.B. (2007), "Private label strategy: How to meet the store brand challenge." Boston: Harvard Business School Press.
- Lee, P.M. (2002), "Behavioral model of online purchasers in e-commerce environment," *Electronic Commerce Research*, Vol. 2 No. (1-2), pp. 75-85.
- Lee, P.M. and Park, Y. (2009), "The classification and strategic management of services in e-commerce: Development of service taxonomy based on customer perception," *Expert Systems with Applications*, Vol. 36 No. 6, pp. 9618-9624.
- Liao, Z. and Cheung, M. (2001), "Internet based e-shopping and consumer attitude: An empirical study," *Information & Management*, Vol. 38 No. 5, pp. 299-306.

- Limayem, M., Khalifa, M. and Frini, A. (2000), "What makes consumers buy from Internet? A longitudinal study of online shopping," *IEEE Transactions on Systems, Man & Cybernetics*, Vol. 30 No. 4, pp. 421-432.
- Makoto, A. (1995), "Price and advertising strategy of a national brand threat against its private-label clone: a signaling game approach," *Journal of Business Research*, Vol. 33 No. 3, pp. 241-250.
- Markus, L. and Soh, C. (2002), "Structural influences on global e-commerce activity," *Journal of Global Information Management*, Vol. 10 No. 1, pp. 5-12.
- McConnell, J.D. (1968), "Effect of pricing on perception of product quality," *Journal of Applied Psychology*, Vol. 52 No. 4, pp. 331-334.
- Mintel's Global New Products Database (2013), "The private label food consumer – UK," available at:
<http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-region/united-states/private-label-trends-packaged-food-in-the-united-states/?id=1411052494795> (accessed at 9 February 2016).
- Morganosky, M. A. and Cude, B.J. (2002), "Consumer demand for online food retailing: is it really a supply side issue?," *International Journal of Retail & Distribution Management*, Vol. 30 No. 10, pp. 451-458.
- Morton, S.F. and Zettelmeyer, F. (2004), "The strategic positioning of store brands in retailer-manufacturer negotiation," *Review of Industrial Organization*, Vol. 24 No. 2, pp. 161-194.
- Nair, V. (2015), "Enhancing category acceptance: A study of private labels in food," Bansal, A., Phatak, Y., and Sharma, R.K. (Eds) in *Quality management practices for global excellence*, pp. 394-400. Indore: Allied Publishers Pvt. Ltd.
- Nielsen (2014, November), "The state of private labels around the world," available at:
<http://www.nielsen.com/content/dam/niensenglobal/kr/docs/global-report/2014/Nielsen%20Global%20Private%20Label%20Report%20November%202014.pdf> (accessed 27 October 2015).
- Nielsen (August, 2012), "Global consumers' intent to buy food and beverages online grows 44 percent in two years," available at <http://www.nielsen.com/ca/en/press-room/2012/global-consumers--intent-to-buy-food-and-beverages-online-grows-.html> (accessed 13 October 2015).
- Packaged Facts (September, 2014), "Private labels foods and beverages in the U.S., 8th

- edition,” available at <http://www.packagedfacts.com/Private-Label-Foods-8358109/> (accessed 3 November 2015).
- Pozzi, A. (2013), “E-Commerce as a stockpiling technology: Implications for consumer savings,” *International Journal of Industrial Organization*, Vol. 31 No.6, pp. 677-689.
- Rao, A.R. (2005). “The quality of price as a quality cue,” *Journal of Marketing Research*, Vol. 42 No. 4, pp. 401-405.
- Richardson, P.S. (1997), “Are store brands perceived to be just another brand,” *Journal of Product & Brand Management*, Vol. 6 No. 6, pp. 388-404.
- _____, Jain, A.K. and Dick, A.S. (1996), “Household store brand proneness: a framework,” *Journal of Retailing*, Vol. 72 No. 2, pp. 159-185.
- _____, Dick, A.S., and Jain, A.K. (1994), “Extrinsic and intrinsic cue effects on perceptions of store brand quality,” *Journal of Marketing*, Vol. 58 No. 4, pp. 28-36.
- Rohm, A.J and Swaminathan, V. (2004), “A typology of online shoppers based on shopping motivations,” *Journal of Business Research*, Vol. 57 No. 7, pp. 748-757.
- Scott, S.G., & Bruce, R.A. (1995), “Decision-making style: the development and assessment of a new measure,” *Educational and Psychological Measurement*, Vol. 55 No. 5, pp. 818-831.
- Sethuraman, R., Srinivasan, R. and Kim, D. (1999), “Asymmetric and neighborhood cross-price effects: some empirical generalizations,” *Marketing Science*, Vol. 18 No. 1, pp. 23-41.
- Shah A.K. and Oppenheimer, D.M. (2008), “Heuristics made easy: an effort-reduction framework,” *Psychological Bulletin*, Vol. 134 No 2. pp. 207-222.
- Shankar, V., Smith, A. and Rangaswamy, A. (2003), “Customer satisfaction and loyalty in online and offline environments,” *International Journal of Research in Marketing*, Vol. 20 No. 2, 153-175.
- Shiv, B. and Fedorikhin, A. (1999), “Heart and mind in conflict: The interplay of affect and cognition in consumer decision making,” *Journal of Consumer Research*, Vol. 26 No. 3, pp. 278-292.
- Sinha, I., and Batra, R. (1999), “The effect of consumer price consciousness on private label purchase,” *International Journal of Research in Marketing*, Vol. 16 No. 3, pp. 237-251.
- Snijders, T. A. and Bosker, R.J. (1999), *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. London: Sage Publications.
- Stanovich, K. E. and West, R. (2000), “Individual differences in reasoning: Implications for

- the rationality debate,” *Behavioral and brain sciences*, Vol. 23 No.5, pp. 645-726.
- Steenkamp, J-B. and Dekimpe, M.G. (1997), “The increasing power of store brands: Building loyalty and market share,” *Long Range Planning*, Vol. 30 No.6, pp. 917-930.
- Steenkamp, J-B. and Geyskens, I. (2014), “Manufacturers and retailer strategies to impact store brand share: Global integration, local adaption, and worldwide learning,” *Marketing Science*, Vol. 33 No. 1, pp. 6-26.
- Sudhir, K. and Talukdar, D. (2004), “Does store brand patronage improve store patronage?,” *Review of Industrial Organization*, Vol. 24 No. 2, pp. 143-160.
- Symphony IRI Group (October, 2012), “Private label in Europe 2012,” available at <http://www.iriworldwide.com> (accessed 28 September 2015).
- Thomas, M., Desai and Seenivasan, S. (2011), “How credit card payments increase unhealthy food purchases: Visceral regulation of vices,” *Journal of Consumer Research*, Vol. 38 No. 1, pp. 126-139.
- Thomas, R.P. and Shanteau, J. (2002), “Simple heuristics that make us smart,” *Applied Cognitive Psychology*, Vol. 16 No. 3, pp. 359-360.
- Tversky, A. and Kahneman, D. (1974), “Judgment and uncertainty: Heuristics and biases,” *Science*, Vol. 185 No. 4157, pp. 1124-1131.
- Wu, P.C.S., Yeh, G.Y. and Hsiao, C.R. (2011), “The effect of store image and service quality on brand image and purchase intention for private label brands,” *Australasian Marketing Journal*, Vol. 19 No. 4, pp. 30-39.

7. APPENDIX: HOW ONLINE SHOPPING AFFECTS PRIVATE LABEL FOOD CHOICES

7.1 Appendix: Study 2: Product pairs examples:



Condition 1: Offline shopping









Condition 2: Online shopping

Winkelwagen
Uw winkelwagen is leeg

Home | **Kruidenterswaren** | Conserven en bokalen

Conserve en bokaal

Artikel 1 tot 26 (van de 26 artikelen). Resultaat: 1 Sorteren ▾

 <p>Pompoensoep Knorr</p> <p>€ 3,27</p> <p>Details In winkelmand</p>	 <p>Pompoensoep Carrefour</p> <p>€ 1,95</p> <p>Details In winkelmand</p>
 <p>Tomatensoep met ball...</p> <p>€ 2,69</p> <p>Details In winkelmand</p>	 <p>Tomatensoep met ball...</p> <p>€ 1,95</p> <p>Details In winkelmand</p>
 <p>Groentensoep Knorr</p> <p>€ 1,56</p> <p>Details In winkelmand</p>	 <p>Groentensoep Carrefour</p> <p>€ 1,19</p> <p>Details In winkelmand</p>

**CHAPTER VII:
CONCLUSIONS, CONTRIBUTIONS AND FUTURE
RESEARCH**

CHAPTER VII: GENERAL DISCUSSION

The main objective of this doctoral dissertation was to investigate how we can nudge consumers towards healthier foods by making small marketing changes. In what follows, we first provide a brief overview of how little changes in the *Price*, *Product* and *Place* can help consumers to make more healthy choices by summarizing the core findings of each empirical chapter. Subsequently, we draw general conclusions based on all chapters by discussing both theoretical and practical implications, followed by limitations and suggestions for further research.

1. RECAPITULATION OF CORE FINDINGS

In Chapter II, *Can Fat Taxes and Package Size Restrictions Stimulate Healthy Food Choices?*, we examined how changing the (monetary) value of a product (cf., *Price*) influenced consumers' food choices. In order to do so, we conceptually replicated and extended research by Mishra and Mishra (2011), who showed that consumers prefer bonus packs for virtues, but choose price discounts for vices as a price discount mitigates the guilt of choosing the vice product. More specifically, we showed that consumers are more responsive to changes in the package size (i.e., bonus packs and package size restrictions) than to changes in the price (i.e., price discounts and price premiums) for healthy foods, whereas they are more responsive to changes in the price than to changes in the package size for unhealthy foods. Moreover, we also demonstrated a significant interaction effect between gender, value and the type of intervention: men appeared to be more responsive to changes in the price rather than to changes in the package size, while women are equally responsive to price and package size changes.

In Chapter III, *How the Mere Presence of Variety Fools the Mind: Effects of Intra-Group Variety on Healthiness and Tastiness Perceptions*, we focused on how adapting the product set (cf., *Product*) affected consumers' healthiness and tastiness perceptions. More specifically, consumers perceived the varied product sets as healthier for healthy foods, whereas they were perceived as less healthy for unhealthy foods. For both healthy and unhealthy foods, varied product sets were seen as tastier than non-varied product sets. Both the classification of healthy and unhealthy foods according to a good/bad dichotomy and the marginal utility framework were presented as possible explanations of the occurring effect.

In Chapter IV, *To Squeeze or Not to Squeeze: How Squeeze Tubes Affect Consumers' Serving Sizes*, we investigated if and how changing the product package (cf., *Product*) had an impact on consumers' serving sizes. Therefore, we contrasted the motor fluency hypothesis with the consumption monitoring hypothesis. In Study 1, we showed that consumers used less baking butter when it was offered in a squeeze tube as opposed to a traditional container. In Study 2, we chose for mayonnaise as the focal product, held shape and substance constant, measured user-friendliness and replicated the results of Study 1. As such, these studies showed tentative evidence for the consumption monitoring hypothesis. Finally, in Study 3, we showed that consumption monitoring mediated the effect of product packaging on serving size and demonstrated that this effect was more pronounced for unrestrained eaters.

In Chapter V, *Clicks as a Healthy Alternative to Bricks: How Online Grocery Shopping Reduces Vice Purchases*, we examined if and how the channel type (cf. *Place*) had an effect on consumers' food choices. In a database study, we showed that online consumers chose fewer unhealthy foods than offline consumers. In a first experimental study, we replicated these results and controlled for store atmospherics, order lead time, shopping motives and differential exposure to grocery products in online and offline channels. In a second experimental study, we showed that consumers purchased fewer unhealthy foods online because products are symbolically presented online whereas they are physically presented offline. Finally, in a third and last experimental study, we demonstrated that because a symbolic product presentation decreases the vividness of a product, it diminishes consumers' desire to seek for instant gratification. As such, it leads consumers to buy fewer unhealthy foods.

Finally, in Chapter VI, *How Online Shopping Affects Private Label Food Choices*, we explored if consumers' brand choices for food products differed between the online and offline channel (cf. *Place*). In a database study, we demonstrated that online consumers spent relatively more money on private label foods than offline consumers. In an experimental study, we showed that because consumers' decision style is less intuitive online as opposed to offline, they made less use of the 'price-quality' heuristic. In other words, these online consumers were less affected by this 'a higher price stands for better quality' approach and as such spent relatively more money on private label foods.

2. THEORETICAL IMPLICATIONS

Although each empirical chapter itself illustrated important theoretical contributions, integrating these contributions across chapters sheds more light on how this doctoral dissertation contributes to previous research.

The majority of food research literature confronts consumers with binary food choices by making them choose between a vice and a virtue (e.g., Dhar and Wertenbroch, 2000; Shiv and Fedorikhin, 1999; 2002). Chapter II relies on this trade off style as participants were presented four trials that each contained one vice and one virtue (e.g., a chocolate cookie versus a granola bar). However, in Chapter V and chapter VI, we extend this research as binary choice tasks might not apply to real-world grocery shopping situations. In these chapters, we focused on common grocery shopping situations. In such situations, it is unlikely that consumers trade off vices and virtues as both types of products are not positioned next to each other and consumers are not forced to compare the benefits and downsides of vices and virtues directly.

In Chapter III, we find evidence that varied product sets influence healthy and unhealthy products in opposite ways when it comes to healthiness perceptions. In this Chapter, we thus show that the product type (healthy versus unhealthy) qualifies the variety effect and that as such, researchers should be careful to generalize findings across fundamentally different types of products such as vices and virtues.

Chapter II and Chapter IV both contribute to the product packaging literature. In Chapter II, two streams of literature were merged. A first stream suggests that consumers prefer bonus packs because people prefer gains instead of reduced losses such as a discount (e.g., Chandran and Morwitz, 2006; Diamond and Sanyal, 1990). A second stream suggests that consumers sometimes prefer to limit their consumption and therefore might prefer lower quantities for unhealthy foods (e.g., Wertenbroch, 1998). By building on the research of Mishra and Mishra (2011) that merged these two streams, we conceptually replicated their results and contributed to previous research by showing that also for price premiums and package size restrictions consumers can have different preferences depending on the healthiness of the product. In Chapter IV, we did not focus on promotions that are communicated via the product packaging, instead we introduced user-friendly packaging as an important attribute with substantial implications for consumers' consumption behavior. By comparing a user-friendly package such as a squeeze tube with less user-friendly packages

such as packs or jars, we revealed that consumers used less product quantity when the product is packed in a squeeze tube.

By comparing the online and offline channel (Chapter V and Chapter VI), we also add to the sensory distance literature (e.g., Hoch and Loewenstein, 1991; Loewenstein, 1996; Shiv and Fedorikhin, 1999; 2002). This stream of literature mainly focused on the differential impact of the absence versus presence of unpackaged foods on consumers' desire for gratification. However, in real-life shopping situations, the majority of the food products are not unpackaged, but packaged, and most of the time even in an opaque way. In Chapter V, when comparing the online with the offline channel, we therefore juxtaposed pictures with mainly opaquely packaged products. This means that in the offline channel – which represented our small sensory distance condition – the opaquely packaged products showed much greater sensory distance than the unpackaged products did in previous research. Also the difference in sensory distance between the small sensory distance and large sensory distance condition was much smaller in our case (i.e., pictures versus (opaquely) packaged goods) than in previous research (absence versus presence of unpackaged goods). In that chapter, we nevertheless showed that also such small differences in sensory distance could affect consumers' desire for instant gratification.

Lastly, Chapter V and Chapter VI also extend literature that looks at the influence of product presentation on food choices (e.g., Fishbach and Zhang, 2008; Sela, Berger, and Liu, 2009; van Kleef, Otten, and van Trijp, 2012). Instead of merely concentrating on the impact of product presentation in one and the same channel, we revealed in both chapters that the channel type – online or offline – could affect food choices. Although Chapter V and Chapter VI use different theoretical frameworks, both Chapters take the difference in product presentation (i.e., symbolic versus physical) as a starting point. In Chapter V, we mention that symbolic product presentations are higher in sensory distance compared to physical product presentations. Therefore, symbolic product presentations are less vivid and it becomes more difficult for consumers to experience the gratification that will arise from consuming the products. As a result, online consumers will spend relatively fewer money on vices than offline consumers. In Chapter VI, we state that symbolically presented products create more sensory distance than physically presented products, making it less likely to induce an intuitive decision-making style. Therefore, we hypothesize that online consumers will make less intuitive decisions compared to offline consumers. Moreover, because these consumers differ in their decision-making style (i.e., online less intuitive than offline) and heuristics such as the price-quality heuristic are more likely to be used when consumers are in an intuitive

state, online consumers will apply the price-quality heuristic to a lesser extent. As a result, online consumers will spend relatively more money on private labels products as it will be less likely that they associate the lower price of these products with a lower quality.

Hence, in Chapter V we associate the difference in product presentations with a difference in vividness: symbolic product presentations are less vivid than physical product presentations. In Chapter VI, we link the difference in product presentations with a difference in decision-making style: symbolic product presentations evoke a less intuitive decision-making style than physical product presentations. Although different theoretical frameworks are used, they can be combinable. For example, Loewenstein (1996) suggests that the intensity of affective reactions to a certain product is contingent on the vividness of the product's presentation: the more vivid a presentation is, the more profound the affective reactions will be. Because affective reactions connect with an intuitive decision-making style while deliberate reactions occur more via a cognitive decision-making style (Kahneman & Frederick, 2002), one could expect that the more vivid a product is presented (cf. Chapter V), the more likely it will be that affective responses are evoked and a consumer applies an intuitive decision-making style (cf. Chapter VI) compared to when a product is less vivid. In other words, one could predict that a vivid product presentation makes it more difficult to inhibit automatic, affective processes which are inherent to an intuitive decision-making style.

3. PRACTICAL IMPLICATIONS

The results reported in the Chapters II, III, IV, V and VI might not only be valuable for academic scholars, but also interesting for consumers, public policy makers, marketers, and retailers.

The main objective of this doctoral dissertation was to investigate how we could nudge consumers towards a healthier eating lifestyle. As already mentioned in Chapter I, being obese or overweight leads to several health consequences (e.g., Heo, Allison, Faith, Zhu and Fontaine, 2003; Pi-Sunyer, 1991). Besides these health consequences, obesity also takes its toll at the societal (e.g., Allison, Zannolli and Narayan, 1999; Hertz, Unger, McDonald, Lustick and Biddulph-Krentar, 2004; Levine, 1995) and psychological level (Falkner et al., 2001; Puhl and Heuer, 2010). Although public policy campaigns already provide consumers with nutritional information, many consumers who pursue health goals fail to resist the countless temptations in their food environment (e.g., Baumeister, 2008). Thus, obtrusive

marketing actions such as promoting a healthy lifestyle in public policy campaigns may not always be effective. The findings in this doctoral dissertation lead to several alternative suggestions which can guide consumers towards healthy foods.

In Chapter II, public policy makers can guide consumption by offering bonus packs instead of price discounts, package size reductions or price premiums for healthy foods. As such, consumers will be more responsive to the healthy foods. For unhealthy foods, price is decisive. Thus, offering price premiums instead of price discounts, bonus packs or package size reductions will lower consumers' purchase intention to buy unhealthy foods. In Chapter III, we investigated consumers' healthiness and tastiness perceptions of varied versus non varied product sets. Previous research has shown that such perceptions can influence energy intake and that taste is an important factor in food decisions of both healthy and unhealthy eaters (Provencher, Polivy and Herman; 2009; Tepper and Trail, 1998; Vartanian, Herman and Wansink, 2008). Presenting more varied product sets for healthy foods and less varied product sets for unhealthy foods might help consumers to increase their healthy consumption and decrease their unhealthy consumption. Subsequently, in Chapter IV, our findings provided consumers a way to decrease their servings of unhealthy foods. By promoting squeeze tubes instead of a traditional containers, consumers might lower their consumption of unhealthy foods. In Chapter V, our findings showed that online consumers spend relatively less money on unhealthy foods compared to offline consumers. Therefore, public policy makers might motivate consumers to do their grocery shopping online and as such contribute to consumer welfare. As obesity is especially present among poorer populations in developed nations (e.g., Boumtje, Huang, Lee and lin, 2005) and as Internet is less accessible for these consumers (e.g., Chen and Wellman, 2004), public policy makers can provide low-priced Internet access and guide these consumers towards online grocery shopping. In summary, public policy makers can contribute to welfare by offering bonus packs (cf. Chapter II) and varied assortments (cf. Chapter III) for healthy foods. For unhealthy foods, offering price premiums (cf. Chapter II), less varied assortments (cf. Chapter III), squeeze tubes (cf. Chapter IV) and online shopping (cf. Chapter V), can discourage unhealthy foods consumption.

Also marketers might benefit from our findings. For example, for healthy foods, offering bonus packs (cf. Chapter II) and varied product sets (cf. Chapter III) can stimulate purchases. But also retailers can have interests in our findings. In Chapter V and VI, we showed that consumers' shopping baskets differed in online versus brick-and-mortar outlets. By overcoming risk perceptions (e.g., convincing consumers of the quality of fruits and vegetables online), limiting order lead times and raising consumers' awareness of online

shopping, retailers can convince consumers to do their grocery shopping online and at the same contribute to consumer welfare (cf. Chapter V). When it comes to private label food products, if retailers want to raise the market share of such products, it may be in their interest to make their online webshop as attractive as possible (cf. Chapter VI).

Finally, our findings can be relevant for market researchers. In Chapter V and Chapter VI, we illustrated that food products were symbolically presented online and physically presented offline. Market researchers often solely rely on pictures or descriptions in a survey to collect consumers' perceptions of the targeted products and brands. However, our findings show that such pictures can make the product less vivid because sensory distance is high. Thus, market researchers might keep in mind that different perceptions are likely to be collected when consumers would be confronted with the physical product instead of a picture or description of that product.

4. LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Even though the research presented in this doctoral dissertation offers several contributions, further research is necessary to overcome the limitations of our studies. Below, we discuss the most important limitations and provide suggestions for future research.

First, in Chapter II, we merely measured the intentions that consumers would buy the healthy or unhealthy option. In Chapter III, we only looked at the perceptions of the consumers concerning the healthiness and tastiness of the products. It would be interesting to measure purchase behavior (cf. Chapter V and Chapter VI) or consumption behavior.

Second, in Chapter IV, we measured in three experimental studies how much consumers used of the product when it came in a squeeze tube versus a traditional container. For Study 1 – where participants used baking butter to fry an egg – we might infer that consumers actually 'consumed' the product. However, for Study 2 and Study 3 – where participants used mayonnaise with their fries – we measured how much they put on their plate but not how much they eventually consumed. It could be that the usage of the traditional container resulted in a bigger waste of the product and therefore participants actually consumed the same amount when they used the squeeze tube or the traditional container. Therefore, it is interesting for future research to measure the actual consumption. Additionally, we focused on unhealthy products only. The question is whether the same packaging effect holds for

healthy products. However, not a lot of healthy products are offered in a squeeze tube, thus the practical relevance of this question could be small.

Third, it is not always easy to determine if a product is healthy or unhealthy and if so, how (un)healthy is it? Therefore, in Chapter V, we measured a vice rating per product and calculated a simple average vice index and weighted-average vice index to take the ‘viceness’ of each product into account. Also for private labels and brands (cf. Chapter VI), we can assume that not each private label or brand is equally strong. For example, is the private label ‘A’ stronger, equally strong or less strong than the private label ‘B’? And would that matter? Future research can investigate whether the strength of the private label moderates the channel effect. Possibly the observed effect only holds for (moderately) strong private labels while the low quality of weak private labels withholds consumers from buying them irrespective of the shopping channel.

Fourth, it would be refreshing to look at how technological evolutions can have an impact on online shopping. Recent technology advances make it possible to observe a product from three dimensions which might give the impression of being present such as in an offline environment (Dobrowolski, Pochwatko, Skorko and Bielecki, 2014; Li, Daugherty and Biocca, 2002). Although the online shopping experience is not (yet) comparable to the offline experience, technological enhancements might lower the sensory distance in the online environment. Also touchscreen devices are a technological advancement that might influence consumers’ shopping behavior. Although product presentations on websites and mobile applications are still symbolic, using touchscreen devices might enable consumers to interact more with the displayed product. Therefore, it can be interesting to determine if using touchscreen devices decrease sensory distance, relative to the use of a mouse-driven desktop. Will consumers buy more vices (cf. Chapter V) and less private labels (cf. Chapter VI) via a touchscreen device than via a desktop computer?

Fifth, our lab studies in Chapter II, III and IV used data based on a single moment. For example in Chapter IV, although consumers in Study 1 could replenish their cooking with butter, participants in Studies 2 and 3 used the product upfront and could not take extra mayonnaise on a later moment. Therefore, retail data might be useful to examine the long-term effects and confirm if the decrease in consumers’ serving sizes persists over time when consumers use a squeeze tube.

Sixth, all our studies were conducted in Belgium. Obesity rates, the relative prices and sizes of vices and virtues, the adoption rates of squeeze tubes and of online shopping all might vary across countries. Future research might seek to replicate our findings in other countries.

Lastly, as our objective was to seek ways to contribute to the nudging trend, it was evident that we focused on food products. However, it could also be intriguing to look at utilitarian versus hedonic products. For example, would offering a bonus pack be more attractive to hedonic or to utilitarian products? Would consumers prefer a varied assortment to a greater extent for hedonic or utilitarian products? Would consumers' shopping baskets contain more hedonic products when shopping offline as opposed to online?

In conclusion, this doctoral dissertation provides several alternatives to effectively nudge consumers towards healthier food choices, while also offering a few avenues for further research. We hope this research encourages other researchers to further investigate how we can help consumers to adopt a healthier lifestyle.

5. REFERENCES

- Allison, D.B., Zannolli, R., & Narayan, K.V. (1999). The direct health care costs of obesity in the United States. *American Journal of Public Health, 89*(8), 1194–1199.
- Baumeister, R.F. (2008). Yielding to temptation: Self-control failure, impulsive purchasing, and consumer behavior. *Journal of Consumer Research, 28*(4), 670-676.
- Boumtje, P.I., Huang, C.L, Lee, J.Y., & Lin, B.H. (2005). Dietary habits, demographics, and the development of overweight and obesity among children in the United States. *Food Policy, 30*(2), 115–128.
- Chandran, S. & Morwitz, V.G. (2006). The price of ‘free’dom: Consumer sensitivity to promotions with negative contextual influences. *Journal of Consumer Research, 33*(3), 384–92.
- Chen, W. & Wellman, B. (2004). The global digital divide within and between countries. *IT & Society, 1*(7), 39–45.
- Dhar, R. & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of Marketing Research, 37*(1), 60–71.
- Diamond, W.D., & Sanyal, A. (1990). The effect of framing on the choice of supermarket coupons. *Advances in Consumer Research, 17*(1), 488–493.
- Dobrowolski, P., Pochwatko, G., Skorko, M., & Bielecki, M. (2014). The effects of virtual experience on attitudes toward real brands. *Cyberpsychology Behavior and Social Networking, 17*(2), 125–128.
- Falkner, N.H., Neumark-Sztainer, D., Story, M., Jeffery, R.W., Beuhring, T., & Resnick, M.D. (2001). Social, educational, and psychological correlates of weight status in adolescents. *Obesity Research, 9*(1), 32–42.
- Fishbach, A. & Zhang, Y. (2008). Together or apart: When goals and temptations complement versus compete. *Journal of Personality and Social Psychology, 94*(4), 547–559.
- Heo, M., Allison, D.B., Faith, M.S., Zhu, S., & Fontaine, K.R. (2003). Obesity and quality of life: Mediating effects of pain and comorbidities. *Obesity Research, 11*(2), 209–216.
- Hertz, R.P., Unger, A.N., McDonald, M., Lustik, M.B., & Biddulph- Krentar, J. (2004). The impact of obesity on work limitations and cardiovascular risk factors in the U.S. workforce. *Journal of Occupational Environmental Medicine, 46*(12), 1196–1203.

- Hoch, S.J. & Loewenstein, G.F. (1991). Time-inconsistent preferences and consumer self-control. *Journal of Consumer Research*, 17(4), 492–507.
- Kahneman, D., and Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin & D. Kahneman (Eds.), *Heuristics and Biases* (pp. 49–81). New York: Cambridge University Press.
- Levine, A.A. (1995). Obesity and income: The effect of overweight on wages in women. *Journal of Pediatric Gastroenterology and Nutrition*, 20(3), 354–355.
- Li, H., Daugherty, T.M., & Biocca, F. (2002). Impact of 3-D advertising on product knowledge, brand attitude, and purchase intention: The mediating role of presence. *Journal of Advertising*, 31(3), 43–57.
- Loewenstein, G.F. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65(3), 272–292.
- Mishra, A. & Mishra, H. (2011). The influence of price discount versus bonus pack on the preference for virtue and vice foods. *Journal of Marketing Research* 48(1), 196–206.
- Pi-Sunyer, F.X. (1991). Health implications of obesity. *The American Journal of Clinical Nutrition*, 53(6), 1595S–1603S.
- Provencher, V., Polivy, J., & Herman, C.P. (2009). Perceived healthiness of food. If it's healthy, you can eat more! *Appetite*, 52(2), 340–344.
- Puhl, R.M. & Heuer, C.A. (2010). Obesity stigma: Important considerations for public health. *American Journal of Public Health*, 100(6), 1019–1028.
- Sela, A., Berger, J., & Liu, W. (2009). Variety, vice, and virtue: How assortment size influences option choice. *Journal of Consumer Research*, 35(6), 941–951.
- Shiv, B. & and Fedorikhin, A. (1999). Heart and mind in conflict: The interplay of affect and cognition in consumer decision making. *Journal of Consumer Research*, 26(3), 278–291.
- and ————— (2002). Spontaneous versus controlled influences of stimulus-based affect on choice behavior. *Organizational Behavior and Human Decision Processes*, 87(2), 342–370.
- Tepper, B.J. & Trail, A.C. (1998). Taste or health: A study on consumer acceptance of corn chips. *Food Quality Preference*, 9(4), 267–272.
- van Kleef, E., Otten, K., & and van Trijp, H.C.M. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC Public Health*, 12(1), 1072.
- Vartanian, L.R., Herman, C.P., & Wansink B. (2008). Are we aware of the external factors

that influence our food intake? *Health Psychology*, 27(5), 533–538.

Werthenbroch, K. (1998). Consumption self-control by rationing purchase quantities of virtue and vice. *Marketing Science*, 17(4), 317–337.

